# Mathematics 1 - ADE - English - 2025/2026
# Final exam, Ordinary Call I - Late Enrollement - Practices, for serial number: 1

## Exercise 1

The funds in a bank account between the months 0 and 12 is

| t=month | Funds |
|---|---|
| 0 | 4040 |
| 4 | −2392 |
| 5 | −2260 |
| 7 | −622 |
| 9 | 8 |
| 10 | −760 |

Along which intervals of months the deposit in the account is higher than 8 euros?

1) Along the month interval: $(0, 2)$.

2) Along the months intervals: $(2, 8)$ y $(9, 12)$.

3) Along the months intervals: $(0, 1)$ y $(10, 12)$.

4) Along the months intervals: $(0, 2)$ y $(8, 9)$.

5) Along the month interval: $(0, 2)$.

## Exercise 2

Between the months $t = 0$ and $t = 8$ , the true value of the shares of a company (in euros) are given by the function $C(t) = 11\,670 - 6300\,t^2 + 2840\,t^3 - 450\,t^4 + 24\,t^5$.

Determine the interval whithin the value oscillates between months $t = 1$ and $t = 7$.

1) It oscillates between 8 and 11670.

2) It oscillates between 8 and 11670.

3) It oscillates between 3 and 7792.

4) It oscillates between 8 and 7784.

5) It oscillates between 15 and 7777.

## Exercise 3

Compute the area enclosed by the function $f(x) = 480 - 496\,x - 110\,x^2 + 143\,x^3 - 11\,x^4 - 7\,x^5 + x^6$ and the horizontal axis between the points $x = -7$ and $x = -3$.

1) $\frac{4\,792\,791}{35} = 136936.8857$

2) $\frac{4\,711\,552}{35} = 134615.7714$

3) $\frac{9\,585\,547}{70} = 136936.3857$

4) $\frac{50\,305}{6} = 8384.1667$

5) $\frac{9\,585\,617}{70} = 136937.3857$

6) $\frac{9\,585\,477}{70} = 136935.3857$

7) $\frac{9\,585\,337}{70} = 136933.3857$

8) $\frac{4\,792\,721}{35} = 136934.8857$

## Exercise 4

Determine the values of the parameters , m , t , for which the linear system

$(2 + m)\,x_1 + t\,x_2 + (1 + m)\,x_4 + t\,x_5 == -5 - 3\,m$
$t\,x_2 + t\,x_5 == 0$
$x_1 + x_3 + x_4 + x_5 == -1$
$-x_3 + x_4 == -2$
$x_1 + x_4 + x_5 == -2$

has only a solution.

1) We have unique solution for $m \leq 0, t \leq -2$.

2) We have unique solution for $m \neq 1, t \neq 0$.

3) We have unique solution for $m \leq 1, t \leq 2$.

4) We have unique solution for $m \neq -3, t \neq -2$.

5) We have unique solution for $m \leq -4, t \geq 2$.

# Mathematics 1 - ADE - English - 2025/2026
# Final exam, Ordinary Call I - Late Enrollement - Practices, for serial number: 2

## Exercise 1

The funds in a bank account between the months 2 and 17 is

| t=month | Funds |
|---|---|
| 2 | 62 207 |
| 3 | 67 319 |
| 9 | 8909 |
| 12 | −1153 |
| 14 | −1 |
| 16 | 1279 |

Along which intervals of months the deposit in the account is below −1 euros?

1) Along the months intervals: (2, 11) y (14, 17).

2) Along the months intervals: (2, 3) y (15, 17).

3) Along the month interval: (4, 15).

4) Along the month interval: (11, 17).

5) Along the month interval: (11, 14).

## Exercise 2

Between the months $t=2$ and $t=10$, the true value of the shares of a company (in euros) are given by the function $C(t) = 10\,750 + 28\,800\,t - 16\,680\,t^2 + 4440\,t^3 - 540\,t^4 + 24\,t^5$.

Determine the interval whithin the value oscillates between months $t=3$ and $t=8$.

1) It oscillates between 21502 and 70750.

2) It oscillates between 21502 and 30242.

3) It oscillates between 21500 and 30247.

4) It oscillates between 21495 and 30260.

5) It oscillates between 21502 and 30250.

## Exercise 3

Compute the area enclosed by the function $f(x) = 144\,x + 60\,x^2 - 146\,x^3 - 62\,x^4 + 2\,x^5 + 2\,x^6$ and the horizontal axis between the points $x = 1$ and $x = 4$.

1) $\frac{476\,397}{35} = 13611.3429$

2) $\frac{476\,292}{35} = 13608.3429$

3) $\frac{476\,327}{35} = 13609.3429$

4) $\frac{952\,759}{70} = 13610.8429$

5) $\frac{952\,829}{70} = 13611.8429$

6) $\frac{952\,479}{70} = 13606.8429$

7) $\frac{952\,689}{70} = 13609.8429$

8) $\frac{476\,362}{35} = 13610.3429$

## Exercise 4

Determine the values of the parameters , m , t , for which the linear system

$(1 + m)\,x_1 + x_2 - x_4 == 1 + m$
$-x_1 + (-1 + t)\,x_2 - x_3 + x_5 == 2$
$-x_2 + x_3 + x_4 - x_5 == -3$
$-x_1 - x_2 + x_4 == -1$
$-2\,x_1 + (-1 + t)\,x_2 - x_3 + 2\,x_5 == 3$

has only a solution.

1) We have unique solution for $m \neq 1, t \neq 0$.

2) We have unique solution for $m \neq 0, t \neq 0$.

3) We have unique solution for $m \leq -4, t \leq 4$.

4) We have unique solution for $m \leq 1, t \leq -1$.

5) We have unique solution for $m \leq -2, t \geq 4$.

# Mathematics 1 - ADE - English - 2025/2026
# Final exam, Ordinary Call I - Late Enrollement - Practices, for serial number: 3

## Exercise 1

We deposit 3000 euros in a bank account with a compound interes rate of 3%. At the same time every year we also add in a safe-deposit box (therefore with no interest rate) 3000 euros. How long time is it necessary until the total ammount of money (jointly in the bank account and safe-depsit box) is 45000 euros? (the solution can be found for t between 11 and 16).

1) t = **.1****

2) t = **.3****

3) t = **.5****

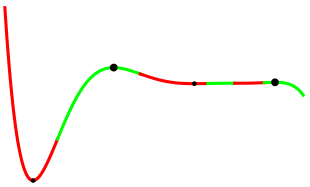
4) t = **.7****

5) t = **.9****

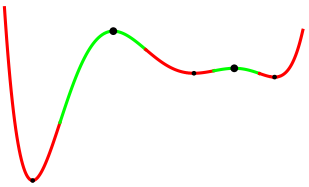
## Exercise 2

Study the shape properties of the $f(x) = 4 + 15\,120\,x - 7560\,x^2 - 4340\,x^3 + 4200\,x^4 - 504\,x^5 - 280\,x^6 + 60\,x^7$ to decide which amongst the following ones is the representation of the function.

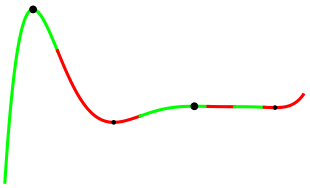
1)



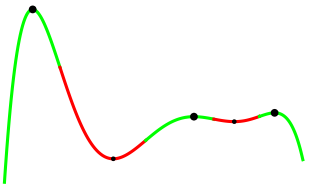
2)



3)



4)



● Big point: maximum

• Small point: minimum

Red line: convexity

Green line: concavity

Indication: To find the maximun and minimum points of the function, try (with Ruffini) the points −2, −1, 0, 1, 2. To solve this exercise it is necessary to determine the increasing and decreasing intervals.

## Exercise 3

Compute the area enclosed by the function $f(x) = -24x - 6x^2 + 27x^3 + 6x^4 - 3x^5$ and the horizontal axis between the points $x = -4$ and $x = 6$.

1) $\frac{44\,702}{5} = 8940.4$

2) $4500$

3) $\frac{89\,389}{10} = 8938.9$

4) $\frac{77\,157}{10} = 7715.7$

5) $\frac{38\,684}{5} = 7736.8$

6) $\frac{89\,399}{10} = 8939.9$

7) $\frac{44\,697}{5} = 8939.4$

8) $\frac{44\,687}{5} = 8937.4$

## Exercise 4

Solve for the matrix X in the following equation:

$$\begin{pmatrix} 1 & 0 & 0 & 1 \\ 0 & 1 & 0 & 0 \\ 0 & -1 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix} \cdot \left( X + \begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 1 & 1 \\ 0 & 0 & 1 & 1 \\ -1 & 1 & 0 & 1 \end{pmatrix} \right) = \begin{pmatrix} 0 & 3 & -2 & 1 \\ -1 & 1 & 1 & 0 \\ 2 & -1 & 0 & 2 \\ 0 & 2 & -1 & 0 \end{pmatrix}$$

1) $\begin{pmatrix} * & 1 & * & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

2) $\begin{pmatrix} * & * & -2 & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

3

) $\begin{pmatrix} * & * & * & 0 \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

4) $\begin{pmatrix} * & * & * & * \\ 0 & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

5) $\begin{pmatrix} * & * & * & * \\ 1 & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

# Mathematics 1 - ADE - English - 2025/2026
# Final exam, Ordinary Call I - Late Enrollement - Practices, for serial number: 4

## Exercise 1

We deposit 16000 euros in a bank account with a compound interes rate of 8%. At the same time every year we also add in a safe-deposit box (therefore with no interest rate) 3000 euros. How long time is it necessary until the total ammount of money (jointly in the bank account and safe-depsit box) is 69000 euros? (the solution can be found for t between 9 and 14).

1) t = **.1****

2) t = **.3****

3) t = **.5****

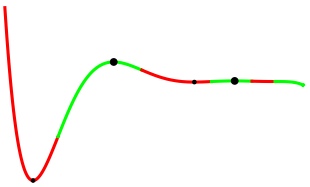
4) t = **.7****

5) t = **.9****

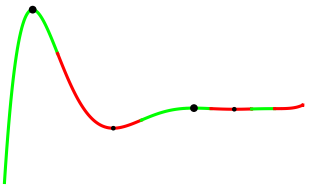
## Exercise 2

Study the shape properties of the $f(x) = 4 + 22\,680\,x - 9450\,x^2 - 7140\,x^3 + 5250\,x^4 - 336\,x^5 - 350\,x^6 + 60\,x^7$ to decide which amongst the following ones is the representation of the function.

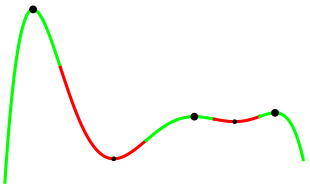
1)



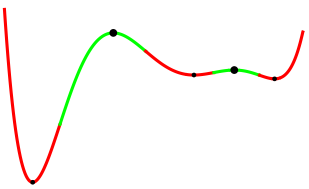
2)



3)



4)



● Big point: maximum

• Small point: minimum

Red line: convexity

Green line: concavity

Indication: To find the maximun and minimum points of the function, try (with Ruffini) the points −2, −1, 0, 1, 2. To solve this exercise it is necessary to determine the increasing and decreasing intervals.

## Exercise 3

Compute the area enclosed by the function $f(x) = 144 + 156\,x - 36\,x^2 - 51\,x^3 + 3\,x^5$ and the horizontal axis between the points $x = -1$ and $x = 5$.

1) 2066

2) 1080

3) $\frac{4133}{2} = 2066.5$

4) $\frac{4131}{2} = 2065.5$

5) 2064

6) 2067

7) $\frac{4135}{2} = 2067.5$

8) 2068

## Exercise 4

Solve for the matrix X in the following equation:

$$\left(X - \begin{pmatrix} 2 & 0 & 1 & 0 \\ 2 & 1 & 1 & 0 \\ 1 & 0 & 1 & 0 \\ 1 & -1 & 0 & 1 \end{pmatrix}\right) \cdot \begin{pmatrix} 1 & 0 & 0 & 0 \\ -2 & -1 & -2 & -4 \\ 0 & 0 & 1 & 1 \\ 1 & 1 & 1 & 2 \end{pmatrix} = \begin{pmatrix} -2 & -1 & -1 & -2 \\ -2 & 0 & 1 & 2 \\ -2 & 0 & -2 & -3 \\ -6 & -3 & -4 & -9 \end{pmatrix}$$

1) $\begin{pmatrix} -2 & * & * & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

2) $\begin{pmatrix} * & -2 & * & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

3) $\begin{pmatrix} * & -1 & * & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

4) $\begin{pmatrix} * & * & 2 & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

5) $\begin{pmatrix} * & * & * & -1 \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

# Mathematics 1 - ADE - English - 2025/2026
# Final exam, Ordinary Call I - Late Enrollement - Practices, for serial number: 5

## Exercise 1

The funds in a bank account between the months 0 and 11 is

| t=month | Funds |
|---|---|
| 1 | 2405 |
| 2 | 3965 |
| 3 | 5045 |
| 5 | 3461 |
| 6 | 5 |
| 8 | −11 875 |

Along which intervals of months the deposit in the account is below 5 euros?

1) Along the month interval: $(6, 11)$.

2) Along the months intervals: $(0, 1)$ y $(9, 11)$.

3) Along the month interval: $(1, 9)$.

4) Along the month interval: $(0, 6)$.

5) Along none interval.

## Exercise 2

Between the months $t = 0$ and $t = 7$ , the true value of the shares of a company (in euros) are given by the function $C(t) = 503 - 1800\,t^2 + 1640\,t^3 - 360\,t^4 + 24\,t^5$.

Determine the interval whithin the value oscillates between months $t = 0$ and $t = 5$.

1) It oscillates between 7 and 10503.

2) It oscillates between 1 and 10505.

3) It oscillates between 11 and 10495.

4) It oscillates between 7 and 13831.

5) It oscillates between 14 and 10507.

## Exercise 3

Compute the area enclosed by the function $f(x) = -960 + 1472\,x - 436\,x^2 - 124\,x^3 + 47\,x^4 + 2\,x^5 - x^6$ and the horizontal axis between the points $x = -4$ and $x = 2$.

1) $\frac{1\,208\,792}{105} = 11512.3048$

2) $\frac{398\,736}{35} = 11392.4571$

3) $\frac{2\,417\,899}{210} = 11513.8048$

4) $\frac{1\,209\,212}{105} = 11516.3048$

5) $\frac{1\,209\,107}{105} = 11515.3048$

6) $\frac{1\,209\,317}{105} = 11517.3048$

7) $\frac{1\,209\,002}{105} = 11514.3048$

8) $\frac{2\,418\,319}{210} = 11515.8048$

## Exercise 4

Determine the values of the parameters , m , t , for which the linear system

$$(-1 + m)\,x_1 - x_2 + x_3 - x_4 + x_5 == 3 - 2\,m$$
$$-2\,x_1 + t\,x_2 + 2\,x_3 == 8 + t$$
$$-x_1 + x_3 == 4$$
$$2\,x_1 + x_2 + x_4 - x_5 == -3$$
$$-2\,x_1 + x_5 == 5$$

has only a solution.

1) We have unique solution for $m \neq 1, t \neq 2$.

2) We have unique solution for $m \neq -2, t \neq -2$.

3) We have unique solution for $m, t \leq -5$.

4) We have unique solution for $m \geq -5, t \leq -3$.

5) We have unique solution for $m \leq 1, t \leq -1$.

# Mathematics 1 - ADE - English - 2025/2026
# Final exam, Ordinary Call I - Late Enrollement - Practices, for serial number: 6

## Exercise 1

Deposits in certain investment account vary from year to year alternating gains and looses periods. We have the following data about the deposits for different years:

| year | deposits |
|---|---|
| 2 | −5 |
| 3 | −84 |
| 4 | −341 |
| 8 | −6989 |
| 10 | −17 717 |

By means of a interpolation polynomial, obtain the function that yields the deposits in the account for every year t. Employ that function to forecast the exact amount for year $1$.

1) The depositis in the account for year $1$ are $4$.

2) The depositis in the account for year $1$ are $-15$.

3) The depositis in the account for year $1$ are $-7$.

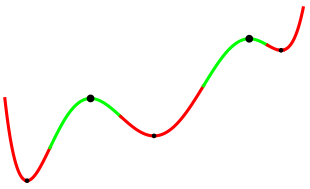
4) The depositis in the account for year $1$ are $-12$.

5) The depositis in the account for year $1$ are $-5$.

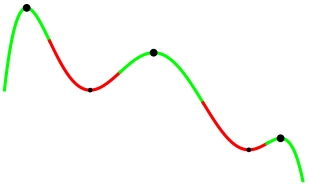
## Exercise 2

Study the shape properties of the $f(x) = 1 + 25\,200\,x - 14\,070\,x^2 - 8260\,x^3 + 7770\,x^4 - 168\,x^5 - 490\,x^6 + 60\,x^7$ to decide which amongst the following ones is the representation of the function.

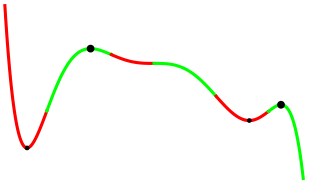
1)



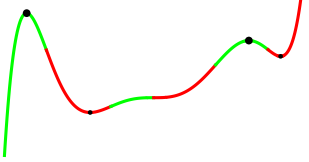
2)



3)



4)



 Big point: maximum

 Small point: minimum

 Red line: convexity

 Green line: concavity

Indication: To find the maximun and minimum points of the function, try (with Ruffini) the points $-2, -1, 0, 1, 2$. To solve this exercise it is necessary to determine the increasing and decreasing intervals.

## Exercise 3

Compute the area enclosed by the function $f(x) = -12\,x - 2\,x^2 + 14\,x^3 + 2\,x^4 - 2\,x^5$ and the horizontal axis between the points $x = -6$ and $x = 7$.

1) $\frac{1\,168\,867}{30} = 38962.2333$

2) $\frac{32\,454}{5} = 6490.8$

3) $\frac{104\,143}{10} = 10414.3$

4) $\frac{1\,164\,179}{30} = 38805.9667$

5) $\frac{77\,635}{2} = 38817.5$

6) $\frac{584\,441}{15} = 38962.7333$

7) $\frac{584\,426}{15} = 38961.7333$

8) $\frac{1\,168\,807}{30} = 38960.2333$

## Exercise 4

Compute de following matrix operations:

$$\begin{pmatrix} 1 & 1 & -1 & -2 \\ -1 & 0 & 1 & 1 \\ 0 & 0 & 1 & 1 \\ 0 & 0 & 1 & 2 \end{pmatrix} \cdot \begin{pmatrix} 1 & -1 & 0 & 1 \\ -1 & -1 & -1 & 0 \\ -1 & 0 & 1 & 0 \\ -1 & 0 & 0 & -1 \end{pmatrix} \cdot \begin{pmatrix} 3 & 0 & 0 & 2 \\ 1 & 1 & 0 & 1 \\ 1 & 0 & 1 & 1 \\ 1 & 0 & 0 & 1 \end{pmatrix}$$

1) $\begin{pmatrix} * & * & * & -11 \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$ 2) $\begin{pmatrix} * & * & * & * \\ -3 & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$ 3

) $\begin{pmatrix} * & * & * & * \\ 4 & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$ 4) $\begin{pmatrix} * & * & * & * \\ * & 1 & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$ 5) $\begin{pmatrix} * & * & * & * \\ * & 5 & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

# Mathematics 1 - ADE - English - 2025/2026
# Final exam, Ordinary Call I - Late Enrollement - Practices, for serial number: 7

## Exercise 1

Deposits in certain investment account vary from year to year alternating gains and looses periods. We have the following data about the deposits for different years:

| year | deposits |
|---|---|
| 0 | 2 |
| 2 | 34 |
| 3 | 185 |
| 5 | 1567 |
| 8 | 10930 |

By means of a interpolation polynomial, obtain the function that yields the deposits in the account for every year t. Employ that function to forecast the exact amount for year 9.

1) The depositis in the account for year 9 are −8.

2) The depositis in the account for year 9 are −15.

3) The depositis in the account for year 9 are 27282.

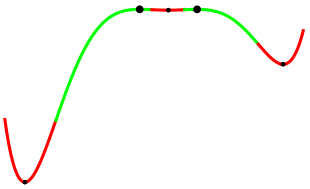
4) The depositis in the account for year 9 are 17723.

5) The depositis in the account for year 9 are 13.

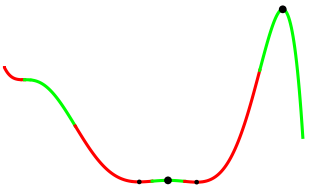
## Exercise 2

Study the shape properties of the $f(x) = 5 + 600\,x^2 - 20\,x^3 - 315\,x^4 + 12\,x^5 + 10\,x^6$ to decide which amongst the following ones is the representation of the function.

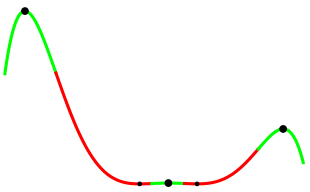
1)



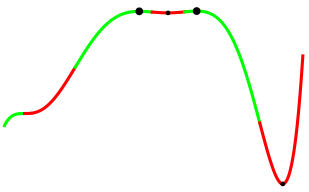
2)



3)



4)



 Big point: maximum

 Small point: minimum

 Red line: convexity

 Green line: concavity

Indication: To find the maximun and minimum points of the function, try (with Ruffini) the points −2, −1, 0, 1, 2. To solve this exercise it is necessary to determine the increasing and decreasing intervals.

## Exercise 3

Compute the area enclosed by the function $f(x) = 48x + 4x^2 - 34x^3 - 16x^4 - 2x^5$ and the horizontal axis between the points $x = -3$ and $x = 3$.

1) $\frac{7416}{5} = 1483.2$

2) $\frac{15\,219}{10} = 1521.9$

3) $\frac{7592}{5} = 1518.4$

4) $\frac{15\,209}{10} = 1520.9$

5) $\frac{15\,199}{10} = 1519.9$

6) $\frac{15\,229}{10} = 1522.9$

7) $\frac{7612}{5} = 1522.4$

8) $\frac{7602}{5} = 1520.4$

## Exercise 4

Compute de following matrix operations:

$$\begin{pmatrix} 2 & 1 & -1 & 1 \\ 1 & 1 & -1 & 1 \\ 0 & 0 & 1 & 0 \\ 0 & -1 & 1 & 0 \end{pmatrix} \cdot \begin{pmatrix} 1 & 1 & -1 & 1 \\ 0 & 1 & -1 & 1 \\ 0 & 1 & 0 & 1 \\ 0 & 0 & -1 & 0 \end{pmatrix} \cdot \begin{pmatrix} 1 & 1 & 0 & 1 \\ -1 & 0 & 0 & 0 \\ 0 & -1 & 1 & -3 \\ -1 & 1 & -1 & 4 \end{pmatrix}$$

1) $\begin{pmatrix} -5 & * & * & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$ 2) $\begin{pmatrix} * & * & * & * \\ 21 & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$ 3)

$\begin{pmatrix} * & * & * & * \\ * & 22 & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$ 4) $\begin{pmatrix} * & * & * & * \\ * & * & -1 & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$ 5) $\begin{pmatrix} * & * & * & * \\ * & * & -4 & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

# Mathematics 1 - ADE - English - 2025/2026
# Final exam, Ordinary Call I - Late Enrollement - Practices, for serial number: 8

## Exercise 1

We deposit 9000 euros in a bank account with a periodic compound interes rate of 1% in 12 periods (compounding frequency). At the same time every year we also add in a safe-deposit box (therefore with no interest rate) 2000 euros. How long time is it necessary until the total ammount of money (jointly in the bank account and safe-depsit box) is 45000 euros? (the solution can be found for t between 13 and 18 ).

1) t = **.1****

2) t = **.3****

3) t = **.5****

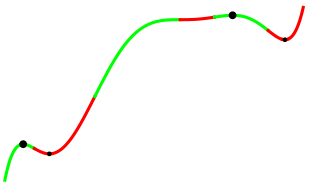
4) t = **.7****

5) t = **.9****

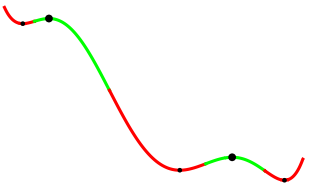
## Exercise 2

Study the shape properties of the $f(x) = 3 - 18\,000\,x + 9750\,x^2 + 240\,x^3 - 570\,x^4 + 10\,x^6$ to decide which amongst the following ones is the representation of the function.

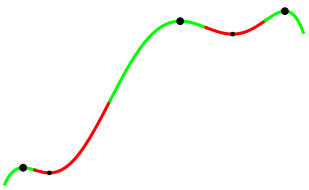
1)



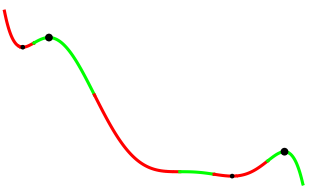
2)



3)



4)



● Big point: maximum

• Small point: minimum

Red line: convexity

Green line: concavity

Indication: To find the maximun and minimum points of the function, try (with Ruffini) the points −2, −1, 0, 1, 2. To solve this exercise it is necessary to determine the increasing and decreasing intervals.

## Exercise 3

Compute the area enclosed by the function $f(x) = -180 + 234\,x - 16\,x^2 - 44\,x^3 + 4\,x^4 + 2\,x^5$ and the horizontal axis between the points $x = -2$ and $x = 5$.

1) $\frac{15401}{5} = 3080.2$

2) $\frac{22519}{15} = 1501.2667$

3) $\frac{15421}{5} = 3084.2$

4) $\frac{15416}{5} = 3083.2$

5) $\frac{15411}{5} = 3082.2$

6) $\frac{30817}{10} = 3081.7$

7) $\frac{30837}{10} = 3083.7$

8) $\frac{30847}{10} = 3084.7$

## Exercise 4

Solve for the matrix X in the following equation:

$$\begin{pmatrix} 1 & 1 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & -1 & 1 & 0 \\ 0 & -1 & 0 & 1 \end{pmatrix} \cdot X + \begin{pmatrix} 1 & 0 & 0 & 0 \\ -4 & 2 & -1 & 0 \\ 2 & -1 & 2 & 1 \\ 0 & 0 & 1 & 1 \end{pmatrix} = \begin{pmatrix} 0 & 2 & 1 & -1 \\ -5 & 3 & -1 & -1 \\ 3 & -1 & 2 & 3 \\ 0 & -2 & 2 & 2 \end{pmatrix}$$

1) $\begin{pmatrix} 1 & * & * & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

2) $\begin{pmatrix} * & -1 & * & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

3) $\begin{pmatrix} * & * & * & 1 \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

4) $\begin{pmatrix} * & * & * & * \\ -1 & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

5) $\begin{pmatrix} * & * & * & * \\ * & -1 & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

# Mathematics 1 - ADE - English - 2025/2026
# Final exam, Ordinary Call I - Late Enrollement - Practices, for serial number: 9

## Exercise 1

We deposit 18000 euros in a bank account with a periodic compound interes rate of 5% in 9 periods (compounding frequency). At the same time every year we also add in a safe-deposit box (therefore with no interest rate) 5000 euros. How long time is it necessary until the total ammount of money (jointly in the bank account and safe-depsit box) is 44000 euros? (the solution can be found for t between 1 and 6 ).

1) t = **.1****

2) t = **.3****

3) t = **.5****

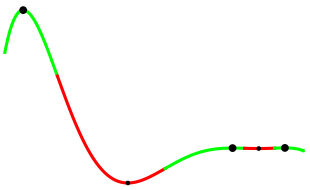
4) t = **.7****

5) t = **.9****

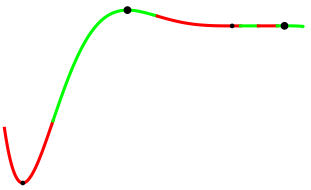
## Exercise 2

Study the shape properties of the $f(x) = 3 + 504\,000\,x + 42\,000\,x^2 - 108\,220\,x^3 + 25\,410\,x^4 + 336\,x^5 - 700\,x^6 + 60\,x^7$ to decide which amongst the following ones is the representation of the function.

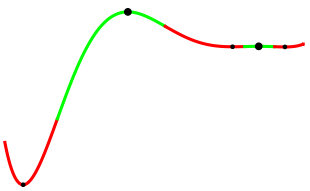
1)



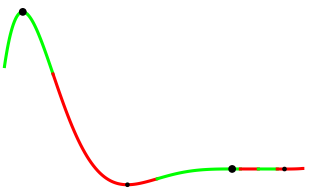
2)



3)



4)



● Big point: maximum

• Small point: minimum

Red line: convexity

Green line: concavity

Indication: To find the maximun and minimum points of the function, try (with Ruffini) the points −2, −1, 0, 1, 2. To solve this exercise it is necessary to determine the increasing and decreasing intervals.

## Exercise 3

Compute the area enclosed by the function $f(x) = 192\,x - 32\,x^2 - 44\,x^3 + 2\,x^4 + 2\,x^5$ and the horizontal axis between the points $x = 0$ and $x = 6$.

1) $\frac{33\,788}{15} = 2252.5333$

2) $\frac{93\,742}{15} = 6249.4667$

3) $\frac{187\,469}{30} = 6248.9667$

4) $\frac{93\,757}{15} = 6250.4667$

5) $\frac{93\,712}{15} = 6247.4667$

6) $\frac{187\,499}{30} = 6249.9667$

7) $\frac{187\,529}{30} = 6250.9667$

8) $\frac{27\,792}{5} = 5558.4$

## Exercise 4

Solve for the matrix X in the following equation:

$$\left(X - \begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & -1 & -2 & 0 \\ 1 & 1 & 1 & 0 \\ 1 & 1 & 1 & 1 \end{pmatrix}\right) \cdot \begin{pmatrix} 1 & 0 & 0 & 0 \\ -1 & -2 & 0 & 3 \\ 0 & -1 & 1 & 1 \\ -1 & -1 & 0 & 1 \end{pmatrix} = \begin{pmatrix} -2 & 0 & -1 & 1 \\ 0 & -2 & 1 & 3 \\ -1 & 1 & -2 & -1 \\ 1 & 2 & -1 & -2 \end{pmatrix}$$

1) $\begin{pmatrix} 0 & * & * & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

2) $\begin{pmatrix} * & * & -2 & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

3) $\begin{pmatrix} * & * & 0 & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

4) $\begin{pmatrix} * & * & 2 & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

5) $\begin{pmatrix} * & * & * & -1 \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

# Mathematics 1 - ADE - English - 2025/2026
# Final exam, Ordinary Call I - Late Enrollement - Practices, for serial number: 10

## Exercise 1

We deposit 4000 euros in a bank account with a periodic compound interes rate of 3% in 7 periods (compounding frequency). At the same time every year we also add in a safe-deposit box (therefore with no interest rate) 2000 euros. How long time is it necessary until the total ammount of money (jointly in the bank account and safe-depsit box) is 34000 euros? (the solution can be found for t between 11 and 16 ).

1) t = **.1****

2) t = **.3****

3) t = **.5****

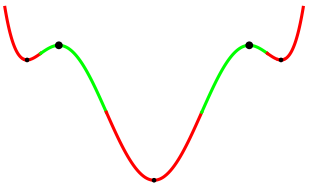
4) t = **.7****

5) t = **.9****

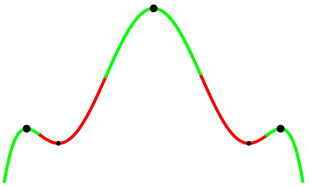
## Exercise 2

Study the shape properties of the $f(x) = 5 - 120\,960\,x^2 + 20\,160\,x^3 + 10\,500\,x^4 - 2100\,x^5 - 280\,x^6 + 60\,x^7$ to decide which amongst the following ones is the representation of the function.

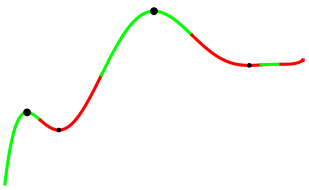
1)



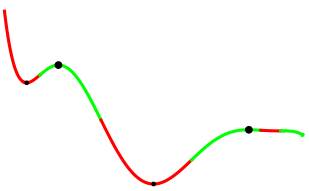
2)



3)



4)




Indication: To find the maximun and minimum points of the function, try (with Ruffini) the points −2, −1, 0, 1, 2. To solve this exercise it is necessary to determine the increasing and decreasing intervals.

## Exercise 3

Compute the area enclosed by the function $f(x) = 400 - 300\,x - 166\,x^2 + 62\,x^3 + 6\,x^4 - 2\,x^5$ and the horizontal axis between the points $x = -5$ and $x = 5$.

1) $\frac{66\,574}{15} = 4438.2667$

2) $\frac{7000}{3} = 2333.3333$

3) $\frac{133\,253}{30} = 4441.7667$

4) $\frac{66\,619}{15} = 4441.2667$

5) $\frac{66\,634}{15} = 4442.2667$

6) $\frac{66\,604}{15} = 4440.2667$

7) $\frac{133\,193}{30} = 4439.7667$

8) $\frac{44\,947}{15} = 2996.4667$

## Exercise 4

Solve for the matrix X in the following equation:

$$\left(X + \begin{pmatrix} 1 & -1 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 1 \\ 0 & 0 & 0 & 1 \end{pmatrix}\right) \cdot \begin{pmatrix} 1 & -1 & 2 & 0 \\ 0 & 0 & 1 & 1 \\ 0 & -1 & 2 & 1 \\ 0 & -1 & 1 & 1 \end{pmatrix}^{-1} = \begin{pmatrix} 2 & 1 & -3 & 2 \\ -1 & -1 & 2 & -1 \\ -1 & 0 & 4 & -4 \\ -1 & 0 & 1 & 1 \end{pmatrix}$$

1) $\begin{pmatrix} 1 & * & * & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

2) $\begin{pmatrix} 0 & * & * & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

3) $\begin{pmatrix} 2 & * & * & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

4) $\begin{pmatrix} * & * & * & 2 \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

5) $\begin{pmatrix} * & * & * & * \\ * & * & 1 & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

# Mathematics 1 - ADE - English - 2025/2026
# Final exam, Ordinary Call I - Late Enrollement - Practices, for serial number: 11

## Exercise 1

The funds in a bank account between the months 0 and 11 is

| t=month | Funds |
|---|---|
| 0 | 14 275 |
| 3 | 2347 |
| 8 | 787 |
| 9 | 955 |
| 10 | −5 |
| 11 | −2357 |

Along which intervals of months the deposit in the account is higher than −5 euros?

1) Along the month interval: (0, 10).

2) Along the months intervals: (0, 4) y (7, 10).

3) Along the month interval: (0, 10).

4) Along the months intervals: (4, 7) y (10, 11).

5) Along the months intervals: (0, 4) y (7, 11).

## Exercise 2

Between the months t= 3 and t= 11
, the true value of the shares of a company (in euros) are given by the function $C(t) = 67\,698 + 75\,600\,t - 31\,860\,t^2 + 6440\,t^3 - 630\,t^4 + 24\,t^5$.

Determine the interval whithin the value oscillates between months t= 3 and t= 11.

1) It oscillates between 135421 and 257272.

2) It oscillates between 135416 and 257272.

3) It oscillates between 135410 and 257281.

4) It oscillates between 135416 and 136440.

5) It oscillates between 135425 and 257279.

## Exercise 3

Compute the area enclosed by the function $f(x) = 720 + 324\,x - 734\,x^2 - 344\,x^3 + 12\,x^4 + 20\,x^5 + 2\,x^6$ and the horizontal axis between the points $x = 2$ and $x = 6$.

1) $\frac{731\,497}{6} = 121916.1667$

2) $\frac{365\,744}{3} = 121914.6667$

3) $\frac{3\,532\,576}{35} = 100930.7429$

4) $\frac{365\,750}{3} = 121916.6667$

5) $\frac{731\,509}{6} = 121918.1667$

6) $\frac{731\,503}{6} = 121917.1667$

7) $\frac{365\,753}{3} = 121917.6667$

8) $\frac{92\,188}{3} = 30729.3333$

## Exercise 4

Determine the values of the parameters , m , t , for which the linear system

$$(-2 + m)\,x_1 - x_2 - x_4 == -5 + m$$
$$2\,x_1 + (-2 + t)\,x_2 + 2\,x_3 - x_5 == 5 + t$$
$$x_1 + x_3 == 3$$
$$x_1 + x_2 + x_4 == 4$$
$$-2\,x_1 - 2\,x_3 + x_5 == -7$$

has only a solution.

1) We have unique solution for $m \neq -2, t \neq 4$.

2) We have unique solution for $m \leq 0, t \leq -2$.

3) We have unique solution for $m \leq 2, t \geq -1$.

4) We have unique solution for $m \geq 4, t \leq 4$.

5) We have unique solution for $m \neq 1, t \neq 0$.

# Mathematics 1 - ADE - English - 2025/2026
# Final exam, Ordinary Call I - Late Enrollement - Practices, for serial number: 12

## Exercise 1

Deposits in certain investment account vary from year to year alternating gains and looses periods. We have the following data about the deposits for different years:

| year | deposits |
|---|---|
| 1 | −1 |
| 3 | 147 |
| 6 | 2544 |
| 7 | 4739 |
| 8 | 8112 |

By means of a interpolation polynomial, obtain the function that yields the deposits in the account for every year t. Employ that function to forecast the exact amount for year $9$.

1) The depositis in the account for year $9$ are $10$.

2) The depositis in the account for year $9$ are $3$.

3) The depositis in the account for year $9$ are $19\,880$.

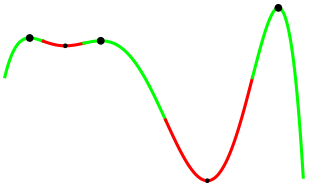
4) The depositis in the account for year $9$ are $14$.

5) The depositis in the account for year $9$ are $13\,023$.

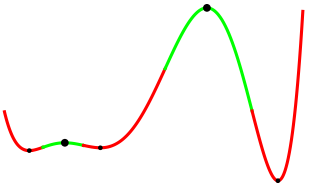
## Exercise 2

Study the shape properties of the $f(x) = 2 - 80\,640\,x - 33\,600\,x^2 + 14\,000\,x^3 + 5880\,x^4 - 1428\,x^5 - 280\,x^6 + 60\,x^7$ to decide which amongst the following ones is the representation of the function.

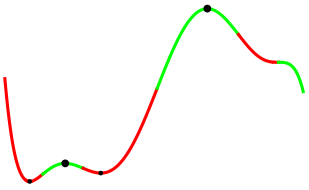
1)



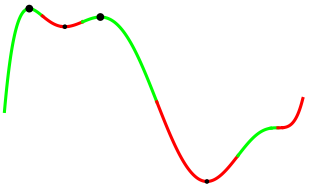
2)



3)



4)



 Big point: maximum

 Small point: minimum

 Red line: convexity

 Green line: concavity

Indication: To find the maximun and minimum points of the function, try (with Ruffini) the points $-2, -1, 0, 1, 2$. To solve this exercise it is necessary to determine the increasing and decreasing intervals.

## Exercise 3

Compute the area enclosed by the function $f(x) = -60\,x + 82\,x^2 - 14\,x^3 - 10\,x^4 + 2\,x^5$ and the horizontal axis between the points $x = 0$ and $x = 3$.

1) $\frac{469}{6} = 78.1667$

2) $\frac{457}{6} = 76.1667$

3) $\frac{230}{3} = 76.6667$

4) $\frac{227}{3} = 75.6667$

5) $\frac{445}{6} = 74.1667$

6) $\frac{463}{6} = 77.1667$

7) $\frac{117}{2} = 58.5$

8) $\frac{233}{3} = 77.6667$

## Exercise 4

Compute de following matrix operations:

$$\begin{pmatrix} 1 & 1 & 1 & 1 \\ 0 & 2 & 0 & 1 \\ -1 & -1 & 0 & -1 \\ 0 & 1 & 2 & 1 \end{pmatrix} \cdot \left( \begin{pmatrix} -1 & 0 & 0 & -1 \\ 0 & 1 & 1 & 0 \\ 0 & -1 & -1 & 0 \\ 0 & -1 & 1 & 0 \end{pmatrix} + 3 \begin{pmatrix} 1 & 0 & 0 & 0 \\ 1 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ -1 & -1 & 0 & 1 \end{pmatrix} \right)$$

1 ) $\begin{pmatrix} * & * & -2 & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$ 2 ) $\begin{pmatrix} * & * & 2 & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$ 3 )

$\begin{pmatrix} * & * & * & -1 \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$ 4 ) $\begin{pmatrix} * & * & * & 4 \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$ 5 ) $\begin{pmatrix} * & * & * & * \\ 3 & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

# Mathematics 1 - ADE - English - 2025/2026
# Final exam, Ordinary Call I - Late Enrollement - Practices, for serial number: 13

## Exercise 1

We deposit 16000 euros in a bank account with a periodic compound interes rate of 2% in 12 periods (compounding frequency). At the same time every year we also add in a safe-deposit box (therefore with no interest rate) 5000 euros. How long time is it necessary until the total ammount of money (jointly in the bank account and safe-depsit box) is 61000 euros? (the solution can be found for t between 5 and 10 ).

1) t = **.0****

2) t = **.2****

3) t = **.4****

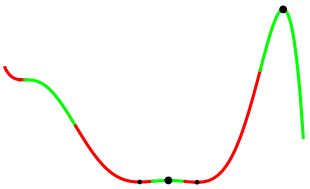
4) t = **.6****

5) t = **.8****

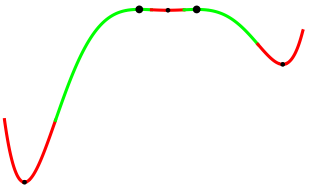
## Exercise 2

Study the shape properties of the $f(x) = 4 - 33\,600\,x^2 + 26\,880\,x^3 - 210\,x^4 - 2604\,x^5 + 60\,x^7$ to decide which amongst the following ones is the representation of the function.

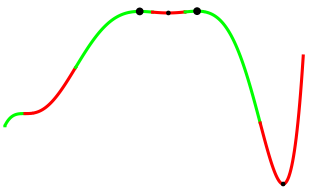
1)



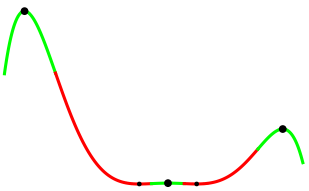
2)



3)



4)



● Big point: maximum

• Small point: minimum

Red line: convexity

Green line: concavity

Indication: To find the maximun and minimum points of the function, try (with Ruffini) the points −2, −1, 0, 1, 2. To solve this exercise it is necessary to determine the increasing and decreasing intervals.

## Exercise 3

Compute the area enclosed by the function $f(x) = 1200 - 400\,x - 123\,x^2 + 41\,x^3 + 3\,x^4 - x^5$ and the horizontal axis between the points $x = -1$ and $x = 5$.

1) $\frac{88\,117}{30} = 2937.2333$

2) $\frac{88\,057}{30} = 2935.2333$

3) $\frac{44\,051}{15} = 2936.7333$

4) $\frac{87\,997}{30} = 2933.2333$

5) $\frac{14\,508}{5} = 2901.6$

6) $\frac{88\,087}{30} = 2936.2333$

7) $\frac{44\,036}{15} = 2935.7333$

8) $\frac{44\,021}{15} = 2934.7333$

## Exercise 4

Solve for the matrix X in the following equation:

$$\begin{pmatrix} 1 & 0 & -1 & 1 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & -1 & 0 & 1 \end{pmatrix} \cdot X + \begin{pmatrix} 1 & 0 & 1 & 2 \\ 0 & 1 & -1 & -2 \\ 0 & 0 & 1 & 2 \\ 0 & -1 & 1 & 3 \end{pmatrix} = \begin{pmatrix} 0 & -2 & 2 & 1 \\ 1 & 0 & -1 & -2 \\ -1 & 0 & 0 & 2 \\ -2 & -1 & 2 & 3 \end{pmatrix}$$

1) $\begin{pmatrix} 1 & * & * & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

2) $\begin{pmatrix} * & -2 & * & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

3) $\begin{pmatrix} * & * & 1 & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

4) $\begin{pmatrix} * & * & * & * \\ * & -1 & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

5) $\begin{pmatrix} * & * & * & * \\ * & * & -1 & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

# Mathematics 1 - ADE - English - 2025/2026
# Final exam, Ordinary Call I - Late Enrollement - Practices, for serial number: 14

## Exercise 1

We deposit 20000 euros in a bank account with a periodic compound interes rate of 7% in 3 periods (compounding frequency). At the same time every year we also add in a safe-deposit box (therefore with no interest rate) 1000 euros. How long time is it necessary until the total ammount of money (jointly in the bank account and safe-depsit box) is 52000 euros? (the solution can be found for t between 6 and 11 ).

1) t = **.1****

2) t = **.3****

3) t = **.5****

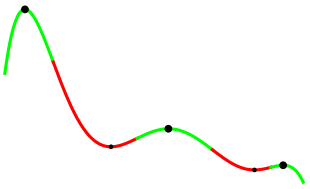
4) t = **.7****

5) t = **.9****

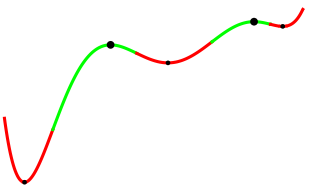
## Exercise 2

Study the shape properties of the $f(x) = 2 + 3600\,x^2 + 280\,x^3 - 405\,x^4 + 10\,x^6$ to decide which amongst the following ones is the representation of the function.

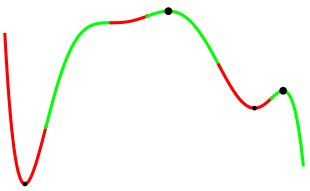
1)



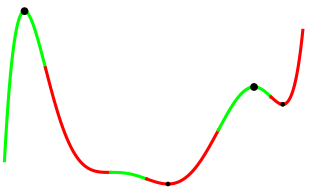
2)



3)



4)



● Big point: maximum

• Small point: minimum

Red line: convexity

Green line: concavity

Indication: To find the maximun and minimum points of the function, try (with Ruffini) the points −2, −1, 0, 1, 2. To solve this exercise it is necessary to determine the increasing and decreasing intervals.

## Exercise 3

Compute the area enclosed by the function $f(x) = -720\,x - 384\,x^2 - 3\,x^3 + 24\,x^4 + 3\,x^5$ and the horizontal axis between the points $x = -7$ and $x = 0$.

1) $\frac{77\,371}{20} = 3868.55$

2) $\frac{79\,361}{20} = 3968.05$

3) $\frac{79\,371}{20} = 3968.55$

4) $\frac{52\,283}{20} = 2614.15$

5) $\frac{79\,311}{20} = 3965.55$

6) $\frac{79\,351}{20} = 3967.55$

7) $\frac{79\,341}{20} = 3967.05$

8) $\frac{78\,533}{20} = 3926.65$

## Exercise 4

Solve for the matrix X in the following equation:

$$\begin{pmatrix} 1 & 0 & -1 & -2 \\ -1 & 1 & 0 & 1 \\ 0 & 0 & 1 & 1 \\ 0 & 0 & 1 & 2 \end{pmatrix}^{-1} \cdot \left( X - \begin{pmatrix} 1 & 1 & -1 & -1 \\ 0 & 1 & 0 & 1 \\ 0 & 1 & 0 & 0 \\ 0 & 1 & 1 & 1 \end{pmatrix} \right) = \begin{pmatrix} -2 & -3 & 0 & -2 \\ 0 & -4 & 0 & 0 \\ 3 & -3 & 0 & 4 \\ -2 & 1 & 0 & -3 \end{pmatrix}$$

1) $\begin{pmatrix} 0 & * & * & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$ 2) $\begin{pmatrix} 2 & * & * & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$ 3) $\begin{pmatrix} * & 0 & * & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

4) $\begin{pmatrix} * & 1 & * & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$ 5) $\begin{pmatrix} * & * & -2 & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

# Mathematics 1 - ADE - English - 2025/2026
# Final exam, Ordinary Call I - Late Enrollement - Practices, for serial number: 15

## Exercise 1

We deposit 20000 euros in a bank account with a compound interes rate of 5%. At the same time every year we also add in a safe-deposit box (therefore with no interest rate) 3000 euros. How long time is it necessary until the total ammount of money (jointly in the bank account and safe-depsit box) is 51000 euros? (the solution can be found for t between 7 and 12).

1) t = **.0****

2) t = **.2****

3) t = **.4****

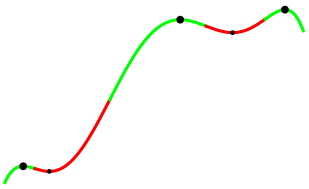
4) t = **.6****

5) t = **.8****

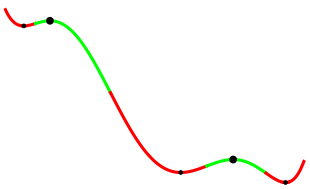
## Exercise 2

Study the shape properties of the $f(x) = 1 + 126\,000\,x - 131\,250\,x^2 + 43\,820\,x^3 + 5250\,x^4 - 3192\,x^5 - 70\,x^6 + 60\,x^7$ to decide which amongst the following ones is the representation of the function.

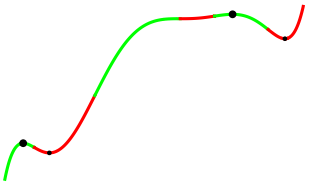
1)



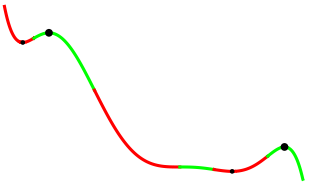
2)



3)



4)



● Big point: maximum

• Small point: minimum

Red line: convexity

Green line: concavity

Indication: To find the maximun and minimum points of the function, try (with Ruffini) the points −2, −1, 0, 1, 2. To solve this exercise it is necessary to determine the increasing and decreasing intervals.

## Exercise 3

Compute the area enclosed by the function $f(x) = 675 - 675\,x - 102\,x^2 + 102\,x^3 + 3\,x^4 - 3\,x^5$ and the horizontal axis between the points $x = -5$ and $x = 4$.

1) $\frac{49\,101}{10} = 4910.1$

2) $\frac{49\,121}{10} = 4912.1$

3) $\frac{15\,309}{10} = 1530.9$

4) $\frac{8169}{2} = 4084.5$

5) $\frac{49\,141}{10} = 4914.1$

6) $\frac{24\,568}{5} = 4913.6$

7) $\frac{49\,131}{10} = 4913.1$

8) $\frac{24\,558}{5} = 4911.6$

## Exercise 4

Solve for the matrix X in the following equation:

$$\begin{pmatrix} 2 & 0 & 0 & -3 \\ 2 & 1 & 2 & -2 \\ 1 & 0 & 1 & -1 \\ -1 & 0 & 0 & 2 \end{pmatrix} \cdot X + \begin{pmatrix} 1 & 1 & -1 & 0 \\ 1 & 2 & 0 & -3 \\ 1 & 1 & 0 & -1 \\ -1 & -1 & 0 & 2 \end{pmatrix} = \begin{pmatrix} 4 & 2 & -6 & 1 \\ 4 & 3 & -6 & -2 \\ 3 & 2 & -3 & 0 \\ -3 & -2 & 3 & 1 \end{pmatrix}$$

1) $\begin{pmatrix} 1 & * & * & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

2) $\begin{pmatrix} 0 & * & * & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

3) $\begin{pmatrix} * & -2 & * & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

4) $\begin{pmatrix} * & 2 & * & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

5) $\begin{pmatrix} * & * & 2 & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

# Mathematics 1 - ADE - English - 2025/2026
# Final exam, Ordinary Call I - Late Enrollement - Practices, for serial number: 16

## Exercise 1

The funds in a bank account between the months 4 and 19 is

| t=month | Funds |
|---|---|
| 7 | −10 |
| 9 | −11 210 |
| 12 | −11 450 |
| 14 | −10 |
| 17 | 18 710 |
| 19 | 21 590 |

Along which intervals of months the deposit in the account is below −10 euros?

1) Along the month interval: (7, 14).

2) Along the months intervals: (4, 5) y (17, 19).

3) Along the month interval: (5, 17).

4) Along the month interval: (7, 19).

5) Along the months intervals: (4, 7) y (14, 19).

## Exercise 2

Between the months $t=1$ and $t=8$ , the true value of the shares of a company (in euros) are given by the function $C(t) = 23\,023 + 40\,320\,t - 22\,200\,t^2 + 5480\,t^3 - 600\,t^4 + 24\,t^5$.

Determine the interval whithin the value oscillates between months $t=3$ and $t=7$.

1) It oscillates between 49375 and 59871.

2) It oscillates between 49372 and 59867.

3) It oscillates between 49379 and 59880.

4) It oscillates between 49368 and 59879.

5) It oscillates between 46047 and 59871.

## Exercise 3

Compute the area enclosed by the function $f(x) = -3600 - 2700\,x + 1294\,x^2 + 308\,x^3 - 96\,x^4 - 8\,x^5 + 2\,x^6$ and the horizontal axis between the points $x = -4$ and $x = 3$.

1) $\frac{2\,045\,741}{105} = 19483.2476$

2) $\frac{4\,091\,797}{210} = 19484.7476$

3) $\frac{4\,091\,377}{210} = 19482.7476$

4) $\frac{67\,571}{15} = 4504.7333$

5) $\frac{2\,045\,531}{105} = 19481.2476$

6) $\frac{4\,091\,587}{210} = 19483.7476$

7) $\frac{2\,045\,951}{105} = 19485.2476$

8) $\frac{2\,045\,846}{105} = 19484.2476$

## Exercise 4

Determine the values of the parameters , m , t , for which the linear system

$$m\,x_1 + x_2 + x_3 + x_4 - x_5 == 4 + m$$
$$(2 - t)\,x_1 + (-2 + t)\,x_2 - x_3 + (-2 + t)\,x_4 + x_5 == -6 + 3\,t$$
$$-x_1 + x_2 + x_3 + x_4 - x_5 == 3$$
$$x_1 - x_2 + x_5 == 1$$
$$x_1 - x_2 - x_4 + x_5 == -1$$

has only a solution.

1) We have unique solution for $m \le -3, t \le -1$.

2) We have unique solution for $m \le -3, t \le 4$.

3) We have unique solution for $m \neq -2, t \neq 2$.

4) We have unique solution for $m \ge -4, t \ge 4$.

5) We have unique solution for $m \neq -1, t \neq 2$.

# Mathematics 1 - ADE - English - 2025/2026
# Final exam, Ordinary Call I - Late Enrollement - Practices, for serial number: 17

## Exercise 1

We deposit 4000 euros in a bank account with a periodic compound interes rate of 2% in 6 periods (compounding frequency). At the same time every year we also add in a safe-deposit box (therefore with no interest rate) 5000 euros. How long time is it necessary until the total ammount of money (jointly in the bank account and safe-depsit box) is 35000 euros? (the solution can be found for t between 2 and 7 ).

1) t = **.0****

2) t = **.2****

3) t = **.4****

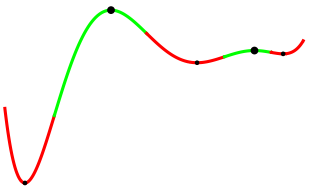
4) t = **.6****

5) t = **.8****

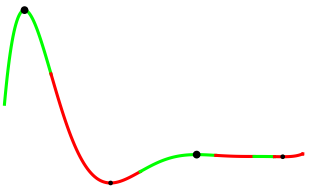
## Exercise 2

Study the shape properties of the $f(x) = 5 + 151\,200\,x - 91\,980\,x^2 - 2380\,x^3 + 12\,810\,x^4 - 2016\,x^5 - 280\,x^6 + 60\,x^7$ to decide which amongst the following ones is the representation of the function.

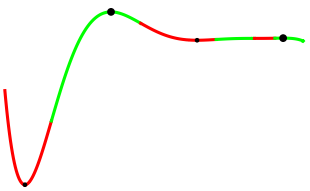
1)



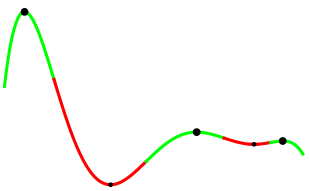
2)



3)



4)



 Big point: maximum

 Small point: minimum

 Red line: convexity

 Green line: concavity

Indication: To find the maximun and minimum points of the function, try (with Ruffini) the points −2, −1, 0, 1, 2. To solve this exercise it is necessary to determine the increasing and decreasing intervals.

## Exercise 3

Compute the area enclosed by the function $f(x) = 45x + 24x^2 - 42x^3 - 24x^4 - 3x^5$ and the horizontal axis between the points $x = -4$ and $x = 3$.

1) $\frac{21603}{10} = 2160.3$

2) $\frac{3623}{2} = 1811.5$

3) $\frac{10819}{5} = 2163.8$

4) $\frac{21623}{10} = 2162.3$

5) $\frac{19901}{10} = 1990.1$

6) $\frac{21643}{10} = 2164.3$

7) $\frac{10814}{5} = 2162.8$

8) $\frac{21633}{10} = 2163.3$

## Exercise 4

Solve for the matrix X in the following equation:

$$\begin{pmatrix} 0 & 2 & -1 & -1 \\ -1 & 2 & -1 & -1 \\ 0 & 1 & 0 & -1 \\ -1 & 2 & -1 & 0 \end{pmatrix} \cdot X + \begin{pmatrix} 1 & 0 & 2 & 0 \\ 0 & 1 & 0 & 0 \\ -1 & 0 & -1 & 0 \\ 0 & 1 & 0 & 1 \end{pmatrix} = \begin{pmatrix} 2 & -2 & 4 & 3 \\ 2 & -1 & 3 & 4 \\ -1 & -1 & 1 & 1 \\ 3 & 0 & 2 & 5 \end{pmatrix}$$

1) $\begin{pmatrix} -1 & * & * & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$ 2) $\begin{pmatrix} 0 & * & * & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$ 3) $\begin{pmatrix} 2 & * & * & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

4) $\begin{pmatrix} * & -2 & * & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$ 5) $\begin{pmatrix} * & * & -2 & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

# Mathematics 1 - ADE - English - 2025/2026
# Final exam, Ordinary Call I - Late Enrollement - Practices, for serial number: 18

## Exercise 1

Deposits in certain investment account vary from year to year alternating gains and looses periods. We have the following data about the deposits for different years:

| year | deposits |
|---|---|
| 0 | 1 |
| 2 | 55 |
| 3 | 271 |
| 7 | 7575 |
| 8 | 12 841 |

By means of a interpolation polynomial, obtain the function that yields the deposits in the account for every year t. Employ that function to forecast the exact amount for year $6$.

1) The depositis in the account for year $6$ are $4123$.

2) The depositis in the account for year $6$ are $2$.

3) The depositis in the account for year $6$ are $-14$.

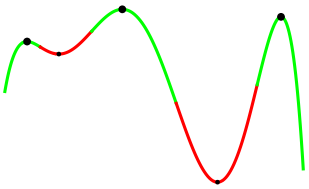
4) The depositis in the account for year $6$ are $7$.

5) The depositis in the account for year $6$ are $7575$.

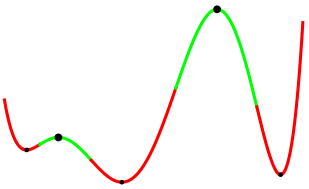
## Exercise 2

Study the shape properties of the $f(x) = 3 + 5760\,x + 2400\,x^2 - 760\,x^3 - 315\,x^4 + 24\,x^5 + 10\,x^6$ to decide which amongst the following ones is the representation of the function.

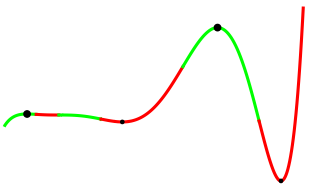
1)



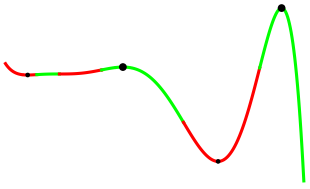
2)



3)



4)



● Big point: maximum

• Small point: minimum

Red line: convexity

Green line: concavity

Indication: To find the maximun and minimum points of the function, try (with Ruffini) the points $-2$, $-1$, $0$, $1$, $2$. To solve this exercise it is necessary to determine the increasing and decreasing intervals.

## Exercise 3

Compute the area enclosed by the function $f(x) = 60\,x - 77\,x^2 + 13\,x^3 + 5\,x^4 - x^5$ and the horizontal axis between the points $x = -6$ and $x = 6$.

1) $\frac{46\,469}{6} = 7744.8333$

2) 4464

3) $\frac{46\,481}{6} = 7746.8333$

4) 7464

5) 4968

6) $\frac{7268}{3} = 2422.6667$

7) $\frac{46\,487}{6} = 7747.8333$

8) $\frac{23\,242}{3} = 7747.3333$

## Exercise 4

Compute de following matrix operations:

$$\begin{pmatrix} 1 & 0 & 1 & 0 \\ -1 & 1 & 0 & 1 \\ 2 & 0 & 2 & -1 \\ -1 & 0 & 0 & 1 \end{pmatrix} \cdot \begin{pmatrix} 0 & 0 & -1 & 1 \\ 0 & 0 & -1 & 0 \\ -1 & 1 & 1 & 0 \\ -1 & 1 & 0 & 0 \end{pmatrix} + \begin{pmatrix} 1 & 0 & 0 & 2 \\ 0 & 5 & -2 & 0 \\ 0 & -2 & 1 & 0 \\ 0 & -2 & 1 & 1 \end{pmatrix}$$

1) $\begin{pmatrix} 1 & * & * & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$ 2) $\begin{pmatrix} * & 7 & * & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$ 3) $\begin{pmatrix} * & * & 2 & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

4) $\begin{pmatrix} * & * & * & 3 \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$ 5) $\begin{pmatrix} * & * & * & * \\ 5 & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

# Mathematics 1 - ADE - English - 2025/2026
# Final exam, Ordinary Call I - Late Enrollement - Practices, for serial number: 19

## Exercise 1

Deposits in certain investment account vary from year to year alternating gains and looses periods. We have the following data about the deposits for different years:

| year | deposits |
|---|---|
| 0 | 3 |
| 3 | 51 |
| 4 | 267 |
| 6 | 1827 |
| 9 | 10 677 |

By means of a interpolation polynomial, obtain the function that yields the deposits in the account for every year t. Employ that function to forecast the exact amount for year $1$.

1) The depositis in the account for year $1$ are $-17$.

2) The depositis in the account for year $1$ are $7$.

3) The depositis in the account for year $1$ are $-3$.

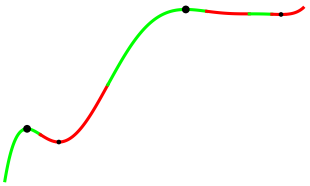
4) The depositis in the account for year $1$ are $-14$.

5) The depositis in the account for year $1$ are $-5$.

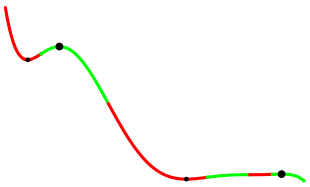
## Exercise 2

Study the shape properties of the $f(x) = 1 + 403\,200\,x - 73\,920\,x^2 - 43\,120\,x^3 + 13\,440\,x^4 + 1092\,x^5 - 700\,x^6 + 60\,x^7$ to decide which amongst the following ones is the representation of the function.

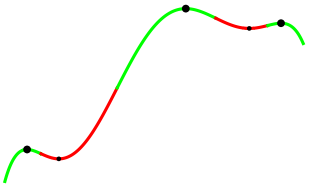
1)



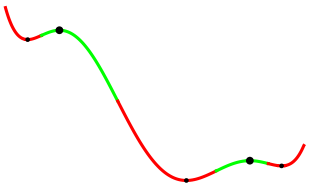
2)



3)



4)



 Big point: maximum

 Small point: minimum

 Red line: convexity

 Green line: concavity

Indication: To find the maximun and minimum points of the function, try (with Ruffini) the points $-2, -1, 0, 1, 2$. To solve this exercise it is necessary to determine the increasing and decreasing intervals.

## Exercise 3

Compute the area enclosed by the function $f(x) = -300 + 250\,x + 112\,x^2 - 60\,x^3 - 4\,x^4 + 2\,x^5$ and the horizontal axis between the points $x = 3$ and $x = 6$.

1) $\frac{14\,763}{10} = 1476.3$

2) $\frac{2943}{5} = 588.6$

3) $\frac{14\,733}{10} = 1473.3$

4) $\frac{7369}{5} = 1473.8$

5) $\frac{7374}{5} = 1474.8$

6) $\frac{7389}{5} = 1477.8$

7) $\frac{7359}{5} = 1471.8$

8) $\frac{7379}{5} = 1475.8$

## Exercise 4

Compute de following matrix operations:

$$\left(\begin{pmatrix} 0 & 1 & 1 & -1 \\ 0 & 0 & 0 & -1 \\ -1 & 0 & 0 & -1 \\ 0 & 0 & 1 & 1 \end{pmatrix} + 2 \begin{pmatrix} 1 & -1 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ -1 & 1 & 1 & 0 \\ -3 & 3 & 1 & 1 \end{pmatrix}\right) \cdot \begin{pmatrix} 1 & 0 & 0 & 0 \\ 1 & 2 & -1 & 0 \\ 0 & -1 & 1 & 0 \\ -2 & -1 & 0 & 1 \end{pmatrix}$$

1) $\begin{pmatrix} -3 & * & * & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$ 2) $\begin{pmatrix} 6 & * & * & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$ 3) $\begin{pmatrix} * & * & -4 & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

4) $\begin{pmatrix} * & * & -2 & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$ 5) $\begin{pmatrix} * & * & * & -1 \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

# Mathematics 1 - ADE - English - 2025/2026
# Final exam, Ordinary Call I - Late Enrollement - Practices, for serial number: 20

## Exercise 1

Deposits in certain investment account vary from year to year alternating gains and looses periods. We have the following data about the deposits for different years:

| year | deposits |
|---|---|
| 1 | 1 |
| 4 | 475 |
| 8 | 8051 |
| 9 | 12 945 |
| 10 | 19 783 |

By means of a interpolation polynomial, obtain the function that yields the deposits in the account for every year t. Employ that function to forecast the exact amount for year 2.

1) The depositis in the account for year 2 are 141.

2) The depositis in the account for year 2 are 23.

3) The depositis in the account for year 2 are −10.

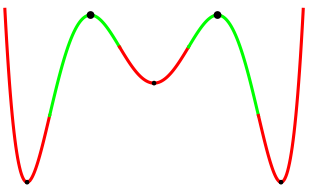
4) The depositis in the account for year 2 are 5.

5) The depositis in the account for year 2 are −13.

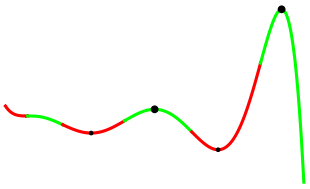
## Exercise 2

Study the shape properties of the $f(x) = 4 + 53\,760\,x^2 + 8960\,x^3 - 8400\,x^4 - 1680\,x^5 + 280\,x^6 + 60\,x^7$ to decide which amongst the following ones is the representation of the function.

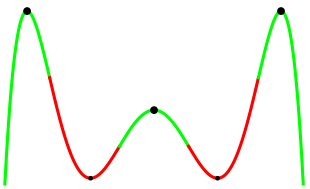
1)



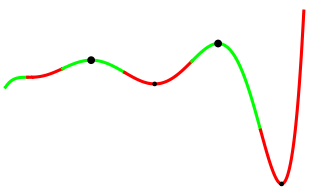
2)



3)



4)



● Big point: maximum

• Small point: minimum

Red line: convexity

Green line: concavity

Indication: To find the maximun and minimum points of the function, try (with Ruffini) the points −2, −1, 0, 1, 2. To solve this exercise it is necessary to determine the increasing and decreasing intervals.

## Exercise 3

Compute the area enclosed by the function $f(x) = 240 + 308\,x + 22\,x^2 - 66\,x^3 - 22\,x^4 - 2\,x^5$ and the horizontal axis between the points $x = -5$ and $x = 2$.

1) $\frac{4588}{5} = 917.6$

2) $\frac{22\,981}{30} = 766.0333$

3) $\frac{9191}{10} = 919.1$

4) $\frac{9181}{10} = 918.1$

5) $\frac{9161}{10} = 916.1$

6) $\frac{4593}{5} = 918.6$

7) $\frac{4598}{5} = 919.6$

8) $\frac{4735}{6} = 789.1667$

## Exercise 4

Compute de following matrix operations:

$$\begin{pmatrix} 1 & 1 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & -1 & 1 & 0 \\ 1 & 0 & 1 & 1 \end{pmatrix} \cdot \begin{pmatrix} 0 & 0 & 0 & 0 \\ 1 & 1 & 1 & 1 \\ 0 & 1 & 0 & -1 \\ -1 & -1 & 1 & 0 \end{pmatrix} + 3 \begin{pmatrix} 1 & 0 & 1 & -1 \\ 2 & 1 & 0 & -1 \\ 0 & 0 & 1 & 0 \\ 1 & 0 & 0 & 0 \end{pmatrix}$$

1) $\begin{pmatrix} 4 & * & * & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

2) $\begin{pmatrix} * & * & 0 & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

3) $\begin{pmatrix} * & * & * & * \\ 4 & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

4) $\begin{pmatrix} * & * & * & * \\ 8 & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

5) $\begin{pmatrix} * & * & * & * \\ * & 7 & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

# Mathematics 1 - ADE - English - 2025/2026
# Final exam, Ordinary Call I - Late Enrollement - Practices, for serial number: 21

## Exercise 1

Deposits in certain investment account vary from year to year alternating gains and looses periods. We have the following data about the deposits for different years:

| year | deposits |
|---|---|
| 0 | 0 |
| 1 | 4 |
| 2 | 48 |
| 3 | 210 |
| 7 | 5278 |

By means of a interpolation polynomial, obtain the function that yields the deposits in the account for every year t. Employ that function to forecast the exact amount for year $5$.

1) The depositis in the account for year $5$ are $2904$.

2) The depositis in the account for year $5$ are $-3$.

3) The depositis in the account for year $5$ are $1440$.

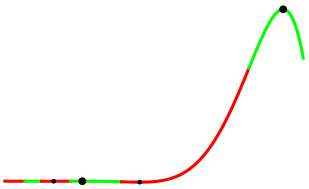
4) The depositis in the account for year $5$ are $-12$.

5) The depositis in the account for year $5$ are $6$.

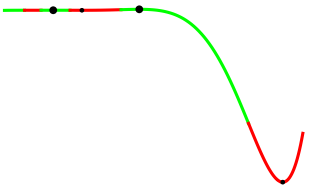
## Exercise 2

Study the shape properties of the $f(x) = 1 - 100\,800\,x^2 - 76\,160\,x^3 - 19\,110\,x^4 - 252\,x^5 + 560\,x^6 + 60\,x^7$ to decide which amongst the following ones is the representation of the function.

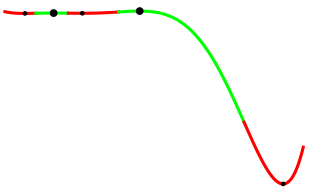
1)



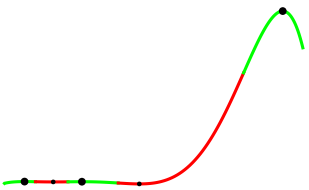
2)



3)



4)




Indication: To find the maximun and minimum points of the function, try (with Ruffini) the points $-2$, $-1$, $0$, $1$, $2$. To solve this exercise it is necessary to determine the increasing and decreasing intervals.

## Exercise 3

Compute the area enclosed by the function $f(x) = 300 + 550\,x + 288\,x^2 + 28\,x^3 - 12\,x^4 - 2\,x^5$ and the horizontal axis between the points $x = 1$ and $x = 5$.

1) $\frac{56\,857}{5} = 11371.4$

2) $\frac{56\,832}{5} = 11366.4$

3) $\frac{113\,709}{10} = 11370.9$

4) $\frac{56\,862}{5} = 11372.4$

5) $\frac{56\,842}{5} = 11368.4$

6) $\frac{56\,847}{5} = 11369.4$

7) $\frac{113\,679}{10} = 11367.9$

8) $\frac{113\,689}{10} = 11368.9$

## Exercise 4

Compute de following matrix operations:

$$\begin{pmatrix} 1 & -1 & -2 & 1 \\ 0 & 0 & -1 & 0 \\ 0 & 1 & 1 & -1 \\ 0 & 0 & 0 & 1 \end{pmatrix} \cdot \begin{pmatrix} 1 & 1 & 1 & -1 \\ -1 & -1 & -1 & -1 \\ 0 & 1 & 1 & 0 \\ 0 & 0 & 1 & -1 \end{pmatrix} + 3 \begin{pmatrix} 1 & 0 & -1 & -2 \\ 0 & 1 & -2 & -1 \\ 1 & -1 & 2 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix}$$

1) $\begin{pmatrix} 3 & * & * & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$ 2) $\begin{pmatrix} * & -7 & * & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$ 3

) $\begin{pmatrix} * & 0 & * & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$ 4) $\begin{pmatrix} * & 2 & * & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$ 5) $\begin{pmatrix} * & 4 & * & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

# Mathematics 1 - ADE - English - 2025/2026
# Final exam, Ordinary Call I - Late Enrollement - Practices, for serial number: 22

## Exercise 1

Deposits in certain investment account vary from year to year alternating gains and looses periods. We have the following data about the deposits for different years:

| year | deposits |
|---|---|
| 0 | 1 |
| 1 | 3 |
| 3 | 307 |
| 4 | 933 |
| 9 | 21 763 |

By means of a interpolation polynomial, obtain the function that yields the deposits in the account for every year t. Employ that function to forecast the exact amount for year $5$.

1) The depositis in the account for year $5$ are $16$.

2) The depositis in the account for year $5$ are $8$.

3) The depositis in the account for year $5$ are $4483$.

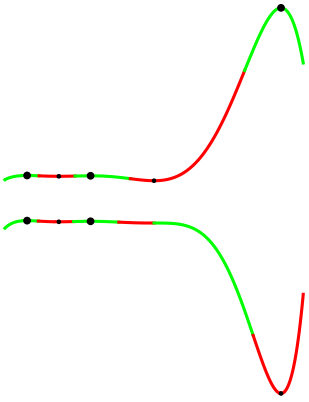
4) The depositis in the account for year $5$ are $3$.

5) The depositis in the account for year $5$ are $2211$.

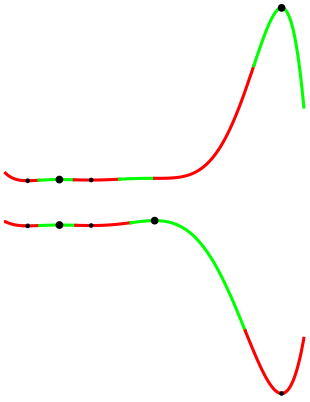
## Exercise 2

Study the shape properties of the $f(x) = 5 - 75\,600\,x - 92\,610\,x^2 - 46\,340\,x^3 - 5250\,x^4 + 2520\,x^5 + 770\,x^6 + 60\,x^7$ to decide which amongst the following ones is the representation of the function.

1)



2)



3)

4)


Indication: To find the maximun and minimum points of the function, try (with Ruffini) the points −2, −1, 0, 1, 2. To solve this exercise it is necessary to determine the increasing and decreasing intervals.

## Exercise 3

Compute the area enclosed by the function $f(x) = -48 - 16\,x + 51\,x^2 + 17\,x^3 - 3\,x^4 - x^5$ and the horizontal axis between the points $x = -7$ and $x = 0$.

1) $\frac{105\,869}{20} = 5293.45$

2) $\frac{310\,189}{60} = 5169.8167$

3) $\frac{23\,527}{15} = 1568.4667$

4) $\frac{105\,809}{20} = 5290.45$

5) $\frac{311\,891}{60} = 5198.1833$

6) $\frac{312\,403}{60} = 5206.7167$

7) $\frac{105\,849}{20} = 5292.45$

8) $\frac{105\,859}{20} = 5292.95$

## Exercise 4

Compute de following matrix operations:

$$\begin{pmatrix} 2 & 1 & 1 & 0 \\ -1 & 0 & -2 & 0 \\ -1 & -1 & 1 & -1 \\ 1 & 1 & 0 & 1 \end{pmatrix} \cdot \begin{pmatrix} -1 & 1 & -1 & 1 \\ 1 & 1 & 1 & 0 \\ 0 & -1 & 1 & 0 \\ 1 & 0 & 0 & 0 \end{pmatrix} \cdot \begin{pmatrix} 1 & -1 & 1 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 2 & 1 & 0 \\ 0 & 1 & -2 & 1 \end{pmatrix}$$

1) $\begin{pmatrix} 4 & * & * & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$ 2) $\begin{pmatrix} * & -6 & * & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$ 3

) $\begin{pmatrix} * & * & 3 & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$ 4) $\begin{pmatrix} * & * & 5 & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$ 5) $\begin{pmatrix} * & * & * & * \\ 1 & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

# Mathematics 1 - ADE - English - 2025/2026
# Final exam, Ordinary Call I - Late Enrollement - Practices, for serial number: 23

## Exercise 1

The population in certain turistic area increases exponentially and is given by the function $P(t) = 95\,000\, e^{t/100}$ that indicates the number of resident citizens for every year t. At the same time, depending on the season, the city receives a variable number of tourists given by the trigonometric function $I(t) = 5000 + 3000\, \text{Sin}\left[\frac{t}{2\,\pi}\right]$ that yields the amount of visitors in the area for every moment t (t in years). Determine how many years are necessary until the total number of habitants is 127000. (the solution can be found for t between 24 and 29).

1) t = **.0****

2) t = **.2****

3) t = **.4****

4) t = **.6****

5) t = **.8****

## Exercise 2

Between the months t= 1 and t= 10, the true value of the shares of a company (in euros) are given by the function $C(t) = 52\,641 + 86\,400\, t - 41\,520\, t^2 + 8480\, t^3 - 750\, t^4 + 24\, t^5$.

Determine the interval whithin the value oscillates between months t= 5 and t= 9.

1) It oscillates between 112884 and 145466.

2) It oscillates between 112891 and 145467.

3) It oscillates between 109217 and 145467.

4) It oscillates between 105275 and 145467.

5) It oscillates between 112899 and 145473.

## Exercise 3

Compute the area enclosed by the function $f(x) = -8100 - 5400\,x + 549\,x^2 + 816\,x^3 + 66\,x^4 - 24\,x^5 - 3\,x^6$ and the horizontal axis between the points $x = -4$ and $x = 3$.

1) $\frac{489\,673}{14} = 34976.6429$

2) $\frac{244\,812}{7} = 34973.1429$

3) $\frac{244\,833}{7} = 34976.1429$

4) $\frac{489\,645}{14} = 34974.6429$

5) $\frac{489\,659}{14} = 34975.6429$

6) $\frac{244\,826}{7} = 34975.1429$

7) $\frac{244\,840}{7} = 34977.1429$

8) $\frac{173\,068}{5} = 34613.6$

## Exercise 4

Solve for the matrix X in the following equation:

$$\left(X - \begin{pmatrix} 2 & 1 & -1 & -1 & 0 \\ 1 & 1 & 1 & 1 & 0 \\ 0 & 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 1 & 0 \\ 1 & 1 & 1 & 2 & 1 \end{pmatrix}\right) \cdot \begin{pmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 1 & -2 & -2 \\ 0 & 0 & 0 & 1 & 1 \\ 0 & 0 & -1 & 2 & 2 \\ 0 & 0 & -1 & 0 & 1 \end{pmatrix} = \begin{pmatrix} -3 & -1 & -2 & 6 & 6 \\ 0 & -1 & 2 & -3 & -4 \\ -1 & -1 & 0 & -1 & -1 \\ -1 & 0 & 0 & 0 & 0 \\ -1 & -2 & 1 & 0 & -1 \end{pmatrix}$$

1) $\begin{pmatrix} -1 & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \end{pmatrix}$

2) $\begin{pmatrix} * & * & 2 & * & * \\ * & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \end{pmatrix}$

3) $\begin{pmatrix} * & * & * & 1 & * \\ * & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \end{pmatrix}$

4) $\begin{pmatrix} * & * & * & 2 & * \\ * & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \end{pmatrix}$

5) $\begin{pmatrix} * & * & * & * & -2 \\ * & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \end{pmatrix}$

# Mathematics 1 - ADE - English - 2025/2026
# Final exam, Ordinary Call I - Late Enrollement - Practices, for serial number: 24

## Exercise 1

The funds in a bank account between the months 3 and 17 is

| t=month | Funds |
|---|---|
| 3 | 61 167 |
| 6 | 46 815 |
| 10 | 15 |
| 15 | −2505 |
| 16 | 15 |
| 17 | 1583 |

Along which intervals of months the deposit in the account is higher than 15 euros?

1) Along the months intervals: $(3, 10)$ y $(16, 17)$.

2) Along the months intervals: $(3, 4)$ y $(15, 17)$.

3) Along the month interval: $(10, 16)$.

4) Along the month interval: $(3, 10)$.

5) Along the month interval: $(5, 15)$.

## Exercise 2

Between the months $t = 1$ and $t = 8$ , the true value of the shares of a company (in euros) are given by the function $C(t) = 17\,006 + 30\,240\,t - 17\,280\,t^2 + 4520\,t^3 - 540\,t^4 + 24\,t^5$.

Determine the interval whithin the value oscillates between months $t = 3$ and $t = 7$.

1) It oscillates between 36338 and 39470.

2) It oscillates between 36330 and 39478.

3) It oscillates between 33970 and 41838.

4) It oscillates between 36347 and 39461.

5) It oscillates between 36340 and 39477.

## Exercise 3

Compute the area enclosed by the function $f(x) = 1440\,x + 288\,x^2 - 400\,x^3 - 80\,x^4 + 10\,x^5 + 2\,x^6$ and the horizontal axis between the points $x = -7$ and $x = 5$.

1) $\frac{97\,707}{2} = 48853.5$

2) $48\,852$

3) $48\,854$

4) $\frac{182\,592}{7} = 26084.5714$

5) $\frac{792\,662}{21} = 37745.8095$

6) $\frac{127\,390}{3} = 42463.3333$

7) $\frac{97\,709}{2} = 48854.5$

8) $\frac{256\,408}{7} = 36629.7143$

## Exercise 4

Determine the values of the parameters , m , t , for which the linear system

$$(2 + m)\,x_1 - t\,x_2 + x_3 - x_4 == 4 + m - t$$
$$-x_1 + t\,x_2 - x_3 + x_4 == -3 + t$$
$$x_1 - x_2 + x_3 - x_4 == 2$$
$$-x_1 + x_2 + 2\,x_4 + x_5 == -3$$
$$x_4 + x_5 == -1$$

has only a solution.

1) We have unique solution for $m \neq -1, t \neq 1$.

2) We have unique solution for $m \neq -1, t \neq -2$.

3) We have unique solution for $m \neq 1, t \neq 0$.

4) We have unique solution for $m \geq 1, t \leq 2$.

5) We have unique solution for $m \leq 0, t \geq 2$.

# Mathematics 1 - ADE - English - 2025/2026
# Final exam, Ordinary Call I - Late Enrollement - Practices, for serial number: 25

## Exercise 1

Deposits in certain investment account vary from year to year alternating gains and looses periods. We have the following data about the deposits for different years:

| year | deposits |
|---|---|
| 0 | 3 |
| 3 | 39 |
| 5 | 213 |
| 8 | 939 |
| 10 | 1873 |

By means of a interpolation polynomial, obtain the function that yields the deposits in the account for every year t. Employ that function to forecast the exact amount for year $2$.

1) The depositis in the account for year $2$ are $2$.

2) The depositis in the account for year $2$ are $9$.

3) The depositis in the account for year $2$ are $3$.

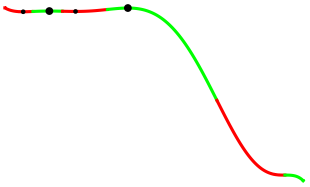
4) The depositis in the account for year $2$ are $-5$.

5) The depositis in the account for year $2$ are $39$.

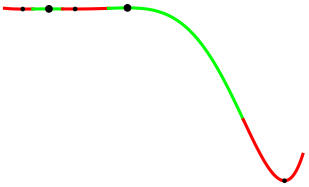
## Exercise 2

Study the shape properties of the $f(x) = 3 + 630\,000\,x + 435\,750\,x^2 + 65\,100\,x^3 - 16\,590\,x^4 - 3864\,x^5 + 210\,x^6 + 60\,x^7$ to decide which amongst the following ones is the representation of the function.

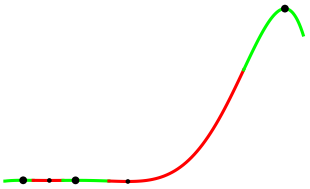
1)



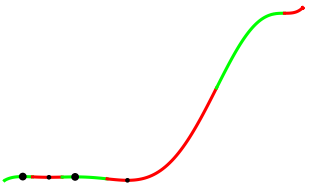
2)



3)



4)



 Big point: maximum

 Small point: minimum

 Red line: convexity

 Green line: concavity

Indication: To find the maximun and minimum points of the function, try (with Ruffini) the points $-2$, $-1$, $0$, $1$, $2$. To solve this exercise it is necessary to determine the increasing and decreasing intervals.

## Exercise 3

Compute the area enclosed by the function $f(x) = -60\,x - 32\,x^2 + 11\,x^3 + 8\,x^4 + x^5$ and the horizontal axis between the points $x = -4$ and $x = 5$.

1) $\frac{449\,963}{60} = 7499.3833$

2) $\frac{449\,903}{60} = 7498.3833$

3) $\frac{434\,617}{60} = 7243.6167$

4) $\frac{450\,053}{60} = 7500.8833$

5) $\frac{145\,773}{20} = 7288.65$

6) $\frac{449\,933}{60} = 7498.8833$

7) $\frac{449\,993}{60} = 7499.8833$

8) $\frac{449\,813}{60} = 7496.8833$

## Exercise 4

Compute de following matrix operations:

$$\left(\begin{pmatrix} -1 & -1 & -1 & 1 \\ 1 & 0 & -1 & 1 \\ 0 & -1 & 1 & 1 \\ -1 & 0 & -1 & 1 \end{pmatrix} - 3 \begin{pmatrix} 1 & 0 & 0 & 0 \\ 2 & 1 & 1 & 0 \\ 3 & 1 & 1 & 1 \\ 1 & 0 & -1 & 1 \end{pmatrix}\right) \cdot \begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 2 \\ -1 & 1 & 1 & -1 \\ 0 & 0 & 0 & 1 \end{pmatrix}$$

1 ) $\begin{pmatrix} -7 & * & * & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$ 2 ) $\begin{pmatrix} -3 & * & * & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$ 3 )

$\begin{pmatrix} -2 & * & * & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$ 4 ) $\begin{pmatrix} * & * & * & -6 \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$ 5 ) $\begin{pmatrix} * & * & * & * \\ -8 & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

# Mathematics 1 - ADE - English - 2025/2026
# Final exam, Ordinary Call I - Late Enrollement - Practices, for serial number: 26

## Exercise 1

The funds in a bank account between the months 3 and 18 is

| t=month | Funds |
|---|---|
| 3 | 18 310 |
| 8 | −1290 |
| 9 | −1394 |
| 12 | 526 |
| 13 | 510 |
| 14 | 6 |

Along which intervals of months the deposit in the account is higher than 6 euros?

1) Along the months intervals: (3, 7), (11, 14) y (16, 18).

2) Along the months intervals: (3, 7) y (16, 18).

3) Along the months intervals: (7, 11) y (14, 16).

4) Along the months intervals: (3, 7) y (11, 18).

5) Along the months intervals: (3, 14) y (16, 18).

## Exercise 2

Between the months $t = 2$ and $t = 11$, the true value of the shares of a company (in euros) are given by the function $C(t) = 477\,721 + 422\,400\,t - 119\,520\,t^2 + 15\,760\,t^3 - 990\,t^4 + 24\,t^5$.

Determine the interval whithin the value oscillates between months $t = 4$ and $t = 8$.

1) It oscillates between 1008153 and 1034777.

2) It oscillates between 1008160 and 1034769.

3) It oscillates between 955449 and 1034777.

4) It oscillates between 1008159 and 1034774.

5) It oscillates between 1008153 and 1034778.

## Exercise 3

Compute the area enclosed by the function $f(x) = 576 + 96\,x - 644\,x^2 - 102\,x^3 + 70\,x^4 + 6\,x^5 - 2\,x^6$ and the horizontal axis between the points $x = -2$ and $x = 2$.

1) 1812

2) $\frac{3623}{2} = 1811.5$

3) 1808

4) $\frac{3619}{2} = 1809.5$

5) $\frac{6464}{21} = 307.8095$

6) 1810

7) 1811

8) $\frac{3621}{2} = 1810.5$

## Exercise 4

Determine the values of the parameters, m, t, for which the linear system

$$m\,x_1 - x_3 + x_4 + x_5 == -1 + m$$
$$m\,x_1 + (-1 + t)\,x_2 - x_4 == 3 + m - 2\,t$$
$$x_3 - x_4 - x_5 == 1$$
$$-x_2 + x_4 == 1$$
$$x_2 + x_5 == -2$$

has only a solution.

1) We have unique solution for $m \neq 0, t \neq 2$.

2) We have unique solution for $m \leq -2, t \leq 5$.

3) We have unique solution for $m \geq 2, t \geq 1$.

4) We have unique solution for $m \neq 0, t \neq 0$.

5) We have unique solution for $m \neq 1, t \neq 0$.

# Mathematics 1 - ADE - English - 2025/2026
# Final exam, Ordinary Call I - Late Enrollement - Practices, for serial number: 27

## Exercise 1

Deposits in certain investment account vary from year to year alternating gains and looses periods. We have the following data about the deposits for different years:

| year | deposits |
|---|---|
| 1 | 7 |
| 4 | 970 |
| 6 | 4562 |
| 7 | 8269 |
| 10 | 33 082 |

By means of a interpolation polynomial, obtain the function that yields the deposits in the account for every year t. Employ that function to forecast the exact amount for year $8$.

1) The depositis in the account for year $8$ are $16$.

2) The depositis in the account for year $8$ are $-19$.

3) The depositis in the account for year $8$ are $13\,874$.

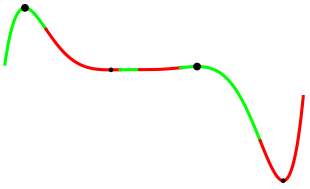
4) The depositis in the account for year $8$ are $5$.

5) The depositis in the account for year $8$ are $21\,935$.

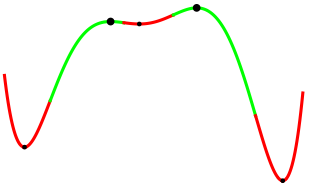
## Exercise 2

Study the shape properties of the $f(x) = 5 + 16\,800\,x + 12\,180\,x^2 - 3500\,x^3 - 6510\,x^4 - 1344\,x^5 + 280\,x^6 + 60\,x^7$ to decide which amongst the following ones is the representation of the function.

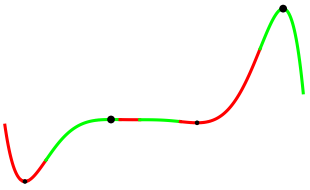
1)



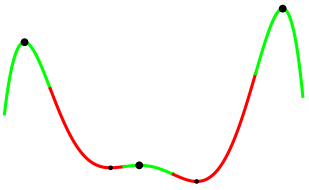
2)



3)



4)



● Big point: maximum

• Small point: minimum

Red line: convexity

Green line: concavity

Indication: To find the maximun and minimum points of the function, try (with Ruffini) the points $-2, -1, 0, 1, 2$. To solve this exercise it is necessary to determine the increasing and decreasing intervals.

## Exercise 3

Compute the area enclosed by the function $f(x) = -120 - 14\,x + 132\,x^2 + 16\,x^3 - 12\,x^4 - 2\,x^5$ and the horizontal axis between the points $x = -6$ and $x = 7$.

1) $\frac{865\,796}{15} = 57719.7333$

2) $\frac{829\,478}{15} = 55298.5333$

3) $\frac{841\,774}{15} = 56118.2667$

4) $\frac{20\,108}{3} = 6702.6667$

5) $\frac{1\,731\,607}{30} = 57720.2333$

6) $\frac{865\,811}{15} = 57720.7333$

7) $\frac{843\,226}{15} = 56215.0667$

8) $\frac{865\,766}{15} = 57717.7333$

## Exercise 4

Compute de following matrix operations:

$$\begin{pmatrix} 1 & 0 & 0 & 1 \\ -1 & 1 & 0 & -2 \\ 0 & 1 & 1 & -2 \\ -1 & 1 & 0 & -1 \end{pmatrix} \cdot \begin{pmatrix} 1 & 0 & 0 & 1 \\ 0 & -1 & -1 & 0 \\ 1 & 0 & 1 & -1 \\ 0 & -1 & 0 & 1 \end{pmatrix} - 2 \begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 1 \\ 0 & 1 & 1 & 0 \\ 0 & -1 & 0 & 0 \end{pmatrix}$$

1) $\begin{pmatrix} -3 & * & * & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$ 2) $\begin{pmatrix} -2 & * & * & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$ 3) $\begin{pmatrix} -1 & * & * & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

4) $\begin{pmatrix} * & -6 & * & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$ 5) $\begin{pmatrix} * & * & * & -5 \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

# Mathematics 1 - ADE - English - 2025/2026
# Final exam, Ordinary Call I - Late Enrollement - Practices, for serial number: 28

## Exercise 1

Deposits in certain investment account vary from year to year alternating gains and looses periods. We have the following data about the deposits for different years:

| year | deposits |
|---|---|
| 1 | −1 |
| 2 | −16 |
| 3 | −79 |
| 5 | −613 |
| 7 | −2371 |

By means of a interpolation polynomial, obtain the function that yields the deposits in the account for every year t. Employ that function to forecast the exact amount for year 6.

1) The depositis in the account for year 6 are 5.

2) The depositis in the account for year 6 are 20.

3) The depositis in the account for year 6 are −1276.

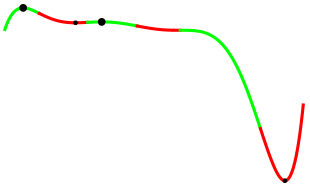
4) The depositis in the account for year 6 are −2371.

5) The depositis in the account for year 6 are 15.

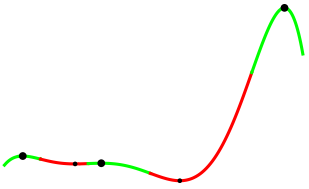
## Exercise 2

Study the shape properties of the $f(x) = 3 - 63\,000\,x + 36\,750\,x^2 + 11\,340\,x^3 - 8610\,x^4 - 2352\,x^5 + 210\,x^6 + 60\,x^7$ to decide which amongst the following ones is the representation of the function.

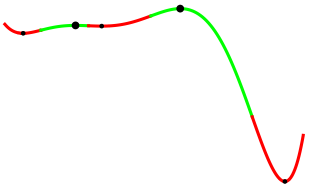
1)



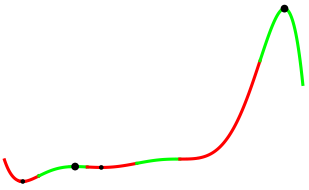
2)



3)



4)



 Big point: maximum

 Small point: minimum

 Red line: convexity

 Green line: concavity

Indication: To find the maximun and minimum points of the function, try (with Ruffini) the points $-2$, $-1$, $0$, $1$, $2$. To solve this exercise it is necessary to determine the increasing and decreasing intervals.

## Exercise 3

Compute the area enclosed by the function $f(x) = 150\,x + 125\,x^2 + 19\,x^3 - 5\,x^4 - x^5$ and the horizontal axis between the points $x = -5$ and $x = 5$.

1) $\frac{12\,500}{3} = 4166.6667$

2) $\frac{26\,983}{6} = 4497.1667$

3) $\frac{26\,989}{6} = 4498.1667$

4) $\frac{13\,490}{3} = 4496.6667$

5) $\frac{13\,496}{3} = 4498.6667$

6) $\frac{13\,100}{3} = 4366.6667$

7) $\frac{13\,493}{3} = 4497.6667$

8) $\frac{13\,484}{3} = 4494.6667$

## Exercise 4

Compute de following matrix operations:

$$\begin{pmatrix} 0 & 0 & 0 & 1 \\ 1 & 0 & 0 & -1 \\ 0 & 0 & 1 & 0 \\ 0 & 1 & 1 & 0 \end{pmatrix} \cdot \left( \begin{pmatrix} 1 & -1 & -1 & 1 \\ 1 & -1 & 0 & -1 \\ 1 & -1 & 1 & 1 \\ -1 & -1 & 0 & -1 \end{pmatrix} + \begin{pmatrix} 2 & 1 & 0 & -3 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ -1 & -1 & 0 & 2 \end{pmatrix} \right)$$

1) $\begin{pmatrix} 3 & * & * & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$ 2) $\begin{pmatrix} * & * & 0 & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$ 3) $\begin{pmatrix} * & * & * & -2 \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

4) $\begin{pmatrix} * & * & * & * \\ 0 & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$ 5) $\begin{pmatrix} * & * & * & * \\ 1 & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

# Mathematics 1 - ADE - English - 2025/2026
# Final exam, Ordinary Call I - Late Enrollement - Practices, for serial number: 29

## Exercise 1

We deposit 7000 euros in a bank account with a periodic compound interes rate of 9% in 5 periods (compounding frequency). At the same time every year we also add in a safe-deposit box (therefore with no interest rate) 3000 euros. How long time is it necessary until the total ammount of money (jointly in the bank account and safe-depsit box) is 55000 euros? (the solution can be found for t between 9 and 14 ).

1) t = **.1****

2) t = **.3****

3) t = **.5****

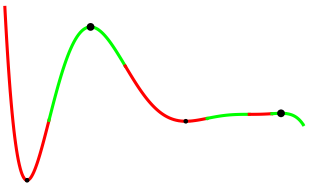
4) t = **.7****

5) t = **.9****

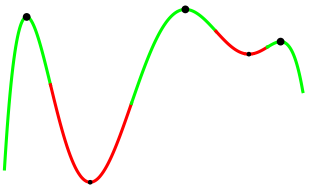
## Exercise 2

Study the shape properties of the $f(x) = 2 - 37\,800\,x^2 + 20\,160\,x^3 + 1155\,x^4 - 2100\,x^5 + 70\,x^6 + 60\,x^7$ to decide which amongst the following ones is the representation of the function.

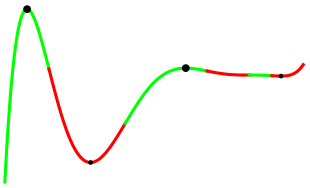
1)



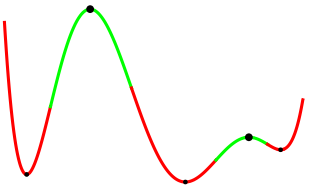
2)



3)



4)



● Big point: maximum

• Small point: minimum

Red line: convexity

Green line: concavity

Indication: To find the maximun and minimum points of the function, try (with Ruffini) the points −2, −1, 0, 1, 2. To solve this exercise it is necessary to determine the increasing and decreasing intervals.

## Exercise 3

Compute the area enclosed by the function $f(x) = -96x - 144x^2 - 42x^3 + 9x^4 + 3x^5$ and the horizontal axis between the points $x = -2$ and $x = 4$.

1) $\frac{13176}{5} = 2635.2$

2) $\frac{26633}{10} = 2663.3$

3) $\frac{13314}{5} = 2662.8$

4) $\frac{13304}{5} = 2660.8$

5) $\frac{26603}{10} = 2660.3$

6) $\frac{13294}{5} = 2658.8$

7) $\frac{13309}{5} = 2661.8$

8) $\frac{26623}{10} = 2662.3$

## Exercise 4

Solve for the matrix X in the following equation:

$$\left(X + \begin{pmatrix} 1 & -1 & 1 & 1 \\ 0 & 1 & 2 & 1 \\ 0 & 0 & 0 & -1 \\ 0 & 0 & 1 & 0 \end{pmatrix}\right) \cdot \begin{pmatrix} 1 & 0 & 0 & 1 \\ 1 & 2 & 1 & 1 \\ 0 & 1 & 1 & 1 \\ 0 & 0 & 0 & 1 \end{pmatrix} = \begin{pmatrix} 0 & -4 & -2 & 0 \\ 1 & 3 & 2 & 3 \\ 0 & 1 & 1 & 0 \\ 1 & 3 & 2 & 1 \end{pmatrix}$$

1) $\begin{pmatrix} 1 & * & * & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

2) $\begin{pmatrix} * & * & 1 & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

3) $\begin{pmatrix} * & * & * & * \\ -2 & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

4) $\begin{pmatrix} * & * & * & * \\ * & -1 & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

5) $\begin{pmatrix} * & * & * & * \\ * & 1 & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

# Mathematics 1 - ADE - English - 2025/2026
# Final exam, Ordinary Call I - Late Enrollement - Practices, for serial number: 30

## Exercise 1

The funds in a bank account between the months 0 and 15 is

| t=month | Funds |
|---|---|
| 2 | −713 |
| 7 | 32 767 |
| 8 | 47 047 |
| 10 | 75 607 |
| 11 | 87 127 |
| 13 | 98 287 |

Along which intervals of months the deposit in the account is below 7 euros?

1) Along the month interval: $(0, 3)$.

2) Along the month interval: $(1, 3)$.

3) Along the months intervals: $(0, 1)$ y $(3, 15)$.

4) Along none interval.

5) Along the months intervals: $(0, 1)$ y $(13, 15)$.

## Exercise 2

Between the months $t = 2$ and $t = 8$ , the true value of the shares of a company (in euros) are given by the function $C(t) = 26\,331 + 40\,320\,t - 22\,200\,t^2 + 5480\,t^3 - 600\,t^4 + 24\,t^5$.

Determine the interval whithin the value oscillates between months $t = 2$ and $t = 7$.

1) It oscillates between 52678 and 63181.

2) It oscillates between 52683 and 63179.

3) It oscillates between 52690 and 63175.

4) It oscillates between 52690 and 63187.

5) It oscillates between 52692 and 63182.

## Exercise 3

Compute the area enclosed by the function $f(x) = -240\,x - 452\,x^2 - 250\,x^3 - 30\,x^4 + 10\,x^5 + 2\,x^6$ and the horizontal axis between the points $x = -6$ and $x = 3$.

1) $\frac{20\,817}{14} = 1486.9286$

2) $\frac{255\,825}{14} = 18273.2143$

3) $\frac{127\,916}{7} = 18273.7143$

4) $\frac{127\,909}{7} = 18272.7143$

5) $\frac{764\,179}{42} = 18194.7381$

6) $\frac{255\,839}{14} = 18274.2143$

7) $\frac{255\,797}{14} = 18271.2143$

8) $\frac{253\,647}{14} = 18117.6429$

## Exercise 4

Determine the values of the parameters , m , t , for which the linear system

$$(2+m)\,x_1 - 2\,x_2 + (2+m)\,x_3 + 2\,x_4 + 2\,x_5 == 10 + m$$
$$(-2-m)\,x_1 + (3+t)\,x_2 + (-2-m)\,x_3 - 2\,x_4 - 2\,x_5 == -10 - m$$
$$-x_2 + x_3 == 1$$
$$x_1 + x_3 + x_4 == 3$$
$$x_1 - x_2 + x_3 + x_4 + x_5 == 5$$

has only a solution.

1) We have unique solution for $m \leq 4, t \leq -4$.

2) We have unique solution for $m \neq 0, t \neq -2$.

3) We have unique solution for $m \leq 2, t \leq -3$.

4) We have unique solution for $m \neq 0, t \neq -3$.

5) We have unique solution for $m, t \leq -4$.

# Mathematics 1 - ADE - English - 2025/2026
# Final exam, Ordinary Call I - Late Enrollement - Practices, for serial number: 31

## Exercise 1

Deposits in certain investment account vary from year to year alternating gains and looses periods. We have the following data about the deposits for different years:

| year | deposits |
|---|---|
| 0 | 0 |
| 1 | −2 |
| 2 | 18 |
| 6 | 1638 |
| 10 | 11 770 |

By means of a interpolation polynomial, obtain the function that yields the deposits in the account for every year t. Employ that function to forecast the exact amount for year 7 .

1) The depositis in the account for year 7 are 18 .

2) The depositis in the account for year 7 are 4968 .

3) The depositis in the account for year 7 are 1 .

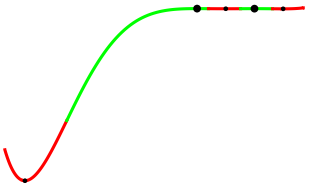
4) The depositis in the account for year 7 are 0 .

5) The depositis in the account for year 7 are 2968 .

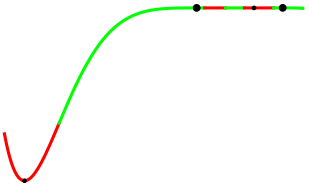
## Exercise 2

Study the shape properties of the $f(x) = 3 - 100\,800\,x + 120\,120\,x^2 - 66\,640\,x^3 + 16\,275\,x^4 - 420\,x^5 - 490\,x^6 + 60\,x^7$ to decide which amongst the following ones is the representation of the function.

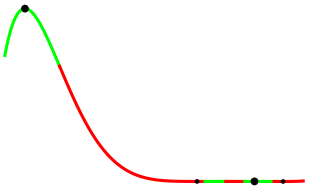
1)



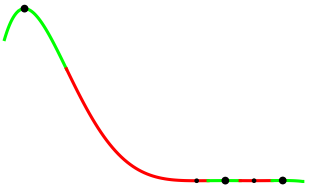
2)



3)



4)



● Big point: maximum

• Small point: minimum

Red line: convexity

Green line: concavity

Indication: To find the maximun and minimum points of the function, try (with Ruffini) the points −2, −1, 0, 1, 2. To solve this exercise it is necessary to determine the increasing and decreasing intervals.

## Exercise 3

Compute the area enclosed by the function $f(x) = -80\,x + 36\,x^2 + 16\,x^3 - 9\,x^4 + x^5$ and the horizontal axis between the points $x = -2$ and $x = 3$.

1) $\frac{961}{5} = 192.2$

2) $\frac{966}{5} = 193.2$

3) $\frac{575}{6} = 95.8333$

4) $\frac{1917}{10} = 191.7$

5) $\frac{4549}{30} = 151.6333$

6) $\frac{1897}{10} = 189.7$

7) $\frac{956}{5} = 191.2$

8) $\frac{1927}{10} = 192.7$

## Exercise 4

Compute de following matrix operations:

$$\begin{pmatrix} 1 & 0 & -1 & 1 \\ 1 & 1 & 1 & -3 \\ -1 & 0 & 0 & 1 \\ 1 & 0 & -1 & 0 \end{pmatrix} \cdot \begin{pmatrix} 1 & 0 & -1 & 0 \\ 1 & -1 & 0 & 0 \\ 0 & 1 & -1 & 1 \\ 0 & -1 & 1 & 1 \end{pmatrix} \cdot \begin{pmatrix} 1 & 1 & 2 & 3 \\ 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 2 \\ 0 & 0 & 0 & 1 \end{pmatrix}$$

1) $\begin{pmatrix} * & -4 & * & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$ 2) $\begin{pmatrix} * & * & -2 & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$ 3

) $\begin{pmatrix} * & * & * & 3 \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$ 4) $\begin{pmatrix} * & * & * & 0 \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$ 5) $\begin{pmatrix} * & * & * & 2 \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

# Mathematics 1 - ADE - English - 2025/2026
# Final exam, Ordinary Call I - Late Enrollement - Practices, for serial number: 32

## Exercise 1

The funds in a bank account between the months 3 and 18 is

| t=month | Funds |
|---|---|
| 8 | −9 |
| 9 | 2631 |
| 11 | 7011 |
| 13 | 4791 |
| 15 | −7149 |
| 16 | −15 849 |

Along which intervals of months the deposit in the account is higher than −9 euros?

1) Along the months intervals: (3, 5) y (8, 18).

2) Along the months intervals: (3, 5) y (8, 14).

3) Along the months intervals: (3, 4) y (16, 18).

4) Along the month interval: (8, 14).

5) Along the months intervals: (5, 8) y (14, 18).

## Exercise 2

Between the months $t=3$ and $t=9$, the true value of the shares of a company (in euros) are given by the function $C(t) = 288\,805 + 241\,920\,t - 76\,080\,t^2 + 11\,480\,t^3 - 840\,t^4 + 24\,t^5$.

Determine the interval whithin the value oscillates between months $t=3$ and $t=8$.

1) It oscillates between 577596 and 583468.

2) It oscillates between 577597 and 583461.

3) It oscillates between 577599 and 583453.

4) It oscillates between 577595 and 583452.

5) It oscillates between 578461 and 583461.

## Exercise 3

Compute the area enclosed by the function $f(x) = 320\,x - 64\,x^2 - 100\,x^3 + 20\,x^4 + 5\,x^5 - x^6$ and the horizontal axis between the points $x = 1$ and $x = 5$.

1) 491

2) 493

3) 492

4) $\frac{981}{2} = 490.5$

5) 490

6) $\frac{1048}{21} = 49.9048$

7) $\frac{983}{2} = 491.5$

8) 488

## Exercise 4

Determine the values of the parameters, m, t, for which the linear system

$$(-1 + m)\,x_1 - x_2 - x_3 == 3 - m$$
$$(-1 + m)\,x_1 + t\,x_2 - x_3 + x_5 == 2 - m - 2\,t$$
$$x_2 + x_3 == -2$$
$$x_1 - x_2 - x_3 + x_4 == 3$$
$$x_1 - x_2 - x_3 + x_4 + x_5 == 4$$

has only a solution.

1) We have unique solution for $m \geq -3, t \geq 1$.

2) We have unique solution for $m \neq 0, t \neq -1$.

3) We have unique solution for $m \neq 4, t \neq -1$.

4) We have unique solution for $m \leq 2, t \leq 0$.

5) We have unique solution for $m \leq -3, t \leq -3$.

# Mathematics 1 - ADE - English - 2025/2026
# Final exam, Ordinary Call I - Late Enrollement - Practices, for serial number: 33

## Exercise 1

The funds in a bank account between the months 2 and 17 is

| t=month | Funds |
|---|---|
| 4 | 8 |
| 7 | 818 |
| 10 | 8 |
| 12 | −5752 |
| 15 | −8902 |
| 17 | 20 028 |

Along which intervals of months the deposit in the account is higher than 8 euros?

1) Along the months intervals: $(2, 10)$ y $(16, 17)$ .

2) Along the months intervals: $(4, 6)$ y $(10, 16)$ .

3) Along the months intervals: $(2, 4)$, $(6, 10)$ y $(16, 17)$ .

4) Along the months intervals: $(2, 4)$ y $(6, 10)$ .

5) Along the months intervals: $(2, 3)$ y $(15, 17)$ .

## Exercise 2

Between the months $t = 2$ and $t = 11$ , the true value of the shares of a company (in euros) are given by the function $C(t) = 209\,556 + 201\,600\,t - 66\,480\,t^2 + 10\,560\,t^3 - 810\,t^4 + 24\,t^5$ .

Determine the interval whithin the value oscillates between months $t = 4$ and $t = 9$ .

1) It oscillates between 437556 and 445332.

2) It oscillates between 419124 and 445332.

3) It oscillates between 440082 and 445332.

4) It oscillates between 440089 and 445324.

5) It oscillates between 440073 and 445334.

## Exercise 3

Compute the area enclosed by the function $f(x) = 720 - 156\,x - 520\,x^2 - 97\,x^3 + 39\,x^4 + 13\,x^5 + x^6$ and the horizontal axis between the points $x = -8$ and $x = -3$.

1) $\frac{1\,123\,107}{140} = 8022.1929$

2) $\frac{1\,123\,247}{140} = 8023.1929$

3) $\frac{3\,347\,179}{420} = 7969.4738$

4) $\frac{1\,123\,317}{140} = 8023.6929$

5) $\frac{3\,305\,621}{420} = 7870.5262$

6) $\frac{1\,123\,037}{140} = 8021.6929$

7) $\frac{1\,122\,827}{140} = 8020.1929$

8) $\frac{652\,145}{84} = 7763.631$

## Exercise 4

Determine the values of the parameters , m , t , for which the linear system

$$\begin{aligned}
&m\,x_1 - x_2 - x_4 - x_5 == -1 + 2\,m\\
&-x_1 + (1 + t)\,x_2 + x_3 == -6 - 2\,t\\
&-x_1 + x_3 == -4\\
&x_2 + x_4 + x_5 == 1\\
&x_2 + x_5 == 0
\end{aligned}$$

has only a solution.

1) We have unique solution for $m \geq 2, t \leq 1$.

2) We have unique solution for $m \neq -1, t \neq 0$.

3) We have unique solution for $m \neq 0, t \neq 1$.

4) We have unique solution for $m \leq -3, t \geq -4$.

5) We have unique solution for $m, t \leq -3$.

# Mathematics 1 - ADE - English - 2025/2026
# Final exam, Ordinary Call I - Late Enrollement - Practices, for serial number: 34

## Exercise 1

Deposits in certain investment account vary from year to year alternating gains and looses periods. We have the following data about the deposits for different years:

| year | deposits |
|---|---|
| 1 | 0 |
| 2 | −5 |
| 6 | −1025 |
| 7 | −1980 |
| 10 | −8829 |

By means of a interpolation polynomial, obtain the function that yields the deposits in the account for every year t. Employ that function to forecast the exact amount for year $9$.

1) The depositis in the account for year $9$ are $-5696$.

2) The depositis in the account for year $9$ are $4$.

3) The depositis in the account for year $9$ are $-8829$.

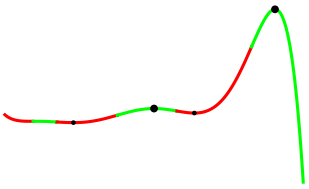
4) The depositis in the account for year $9$ are $11$.

5) The depositis in the account for year $9$ are $3$.

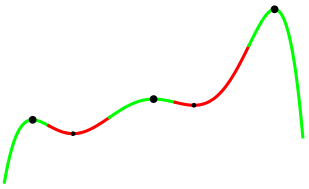
## Exercise 2

Study the shape properties of the $f(x) = 1 - 20\,160\,x^2 - 17\,920\,x^3 - 1470\,x^4 + 2268\,x^5 + 700\,x^6 + 60\,x^7$ to decide which amongst the following ones is the representation of the function.

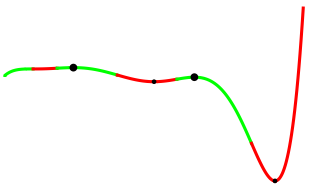
1)



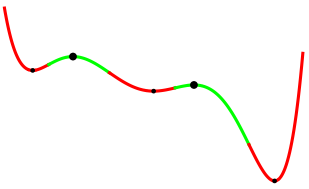
2)



3)



4)



● Big point: maximum

• Small point: minimum

Red line: convexity

Green line: concavity

Indication: To find the maximun and minimum points of the function, try (with Ruffini) the points $-2$, $-1$, $0$, $1$, $2$. To solve this exercise it is necessary to determine the increasing and decreasing intervals.

## Exercise 3

Compute the area enclosed by the function $f(x) = 24x + 34x^2 + 7x^3 - 4x^4 - x^5$ and the horizontal axis between the points $x = -2$ and $x = 3$.

1) $\frac{14861}{60} = 247.6833$

2) $\frac{14741}{60} = 245.6833$

3) $\frac{14891}{60} = 248.1833$

4) $\frac{14981}{60} = 249.6833$

5) $\frac{14951}{60} = 249.1833$

6) $\frac{14921}{60} = 248.6833$

7) $\frac{14831}{60} = 247.1833$

8) $\frac{2875}{12} = 239.5833$

## Exercise 4

Compute de following matrix operations:

$$\left(\begin{pmatrix} 1 & -1 & 1 & 1 \\ -1 & -1 & 1 & 1 \\ -1 & -1 & 1 & 0 \\ -1 & -1 & 1 & 0 \end{pmatrix} - 2 \begin{pmatrix} 1 & 0 & 0 & 1 \\ 0 & 0 & 1 & 1 \\ 0 & -1 & 2 & 2 \\ 0 & 0 & 0 & 1 \end{pmatrix}\right) \cdot \begin{pmatrix} 0 & 0 & -1 & 0 \\ 1 & 1 & 1 & 0 \\ 1 & 0 & 1 & 0 \\ 2 & 1 & 1 & 1 \end{pmatrix}$$

1) $\begin{pmatrix} * & * & -9 & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

2) $\begin{pmatrix} * & * & 0 & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

3) $\begin{pmatrix} * & * & * & * \\ -6 & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

4) $\begin{pmatrix} * & * & * & * \\ 0 & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

5) $\begin{pmatrix} * & * & * & * \\ * & * & -4 & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

# Mathematics 1 - ADE - English - 2025/2026
# Final exam, Ordinary Call I - Late Enrollement - Practices, for serial number: 35

## Exercise 1

The funds in a bank account between the months 0 and 11 is

| t=month | Funds |
|---|---|
| 1 | 5769 |
| 3 | 2361 |
| 4 | 789 |
| 7 | 489 |
| 9 | 969 |
| 11 | −2151 |

Along which intervals of months the deposit in the account is below 9 euros?

1) Along the months intervals: $(0, 5)$ y $(6, 10)$ .

2) Along the months intervals: $(0, 1)$ y $(9, 11)$ .

3) Along the month interval: $(10, 11)$ .

4) Along the month interval: $(10, 11)$ .

5) Along the months intervals: $(5, 6)$ y $(10, 11)$ .

## Exercise 2

Between the months $t = 4$ and $t = 10$ , the true value of the shares of a company (in euros) are given by the function $C(t) = 165\,747 + 151\,200\,t - 53\,220\,t^2 + 9080\,t^3 - 750\,t^4 + 24\,t^5$ .

Determine the interval whithin the value oscillates between months $t = 6$ and $t = 10$ .

1) It oscillates between 331473 and 333425.

2) It oscillates between 331466 and 335753.

3) It oscillates between 331476 and 335751.

4) It oscillates between 331473 and 335755.

5) It oscillates between 331473 and 335747.

## Exercise 3

Compute the area enclosed by the function $f(x) = 2400 + 3200\,x + 554\,x^2 - 328\,x^3 - 76\,x^4 + 8\,x^5 + 2\,x^6$ and the horizontal axis between the points $x = -6$ and $x = 4$.

1) $\frac{5\,199\,637}{210} = 24760.1762$

2) $\frac{5\,199\,427}{210} = 24759.1762$

3) $\frac{1\,994\,704}{105} = 18997.181$

4) $\frac{2\,483\,968}{105} = 23656.8381$

5) $\frac{2\,599\,766}{105} = 24759.6762$

6) $\frac{162\,000}{7} = 23142.8571$

7) $\frac{654\,804}{35} = 18708.6857$

8) $\frac{2\,599\,556}{105} = 24757.6762$

## Exercise 4

Determine the values of the parameters , m , t , for which the linear system

$$(-3 + m)\,x_1 + x_2 + 2\,x_4 + x_5 == 9 - 2\,m$$
$$(-1 - t)\,x_1 + (1 + t)\,x_2 - x_3 - x_4 == 2 + 3\,t$$
$$x_3 - 2\,x_4 - x_5 == -1$$
$$-x_1 + x_2 + x_3 + x_4 == 4$$
$$-x_1 + x_2 + 2\,x_4 + x_5 == 5$$

has only a solution.

1) We have unique solution for $m \geq 5, t \geq -6$.

2) We have unique solution for $m \neq 5, t \neq -2$.

3) We have unique solution for $m \neq 0, t \neq -5$.

4) We have unique solution for $m \leq 3, t \leq 0$.

5) We have unique solution for $m \neq 2, t \neq -2$.

# Mathematics 1 - ADE - English - 2025/2026
# Final exam, Ordinary Call I - Late Enrollement - Practices, for serial number: 36

## Exercise 1

Deposits in certain investment account vary from year to year alternating gains and looses periods. We have the following data about the deposits for different years:

| year | deposits |
|---|---|
| 1 | 2 |
| 5 | 838 |
| 6 | 1677 |
| 9 | 7914 |
| 10 | 11 873 |

By means of a interpolation polynomial, obtain the function that yields the deposits in the account for every year t. Employ that function to forecast the exact amount for year $8$.

1) The depositis in the account for year $8$ are $5035$.

2) The depositis in the account for year $8$ are $4$.

3) The depositis in the account for year $8$ are $-16$.

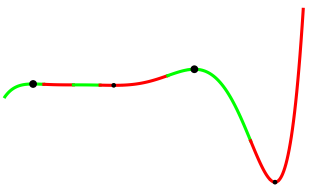
4) The depositis in the account for year $8$ are $7914$.

5) The depositis in the account for year $8$ are $-2$.

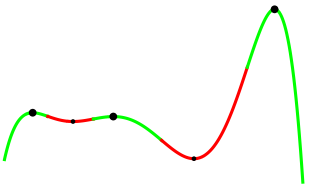
## Exercise 2

Study the shape properties of the $f(x) = 4 - 30\,240\,x^2 - 18\,480\,x^3 - 420\,x^4 + 2436\,x^5 + 700\,x^6 + 60\,x^7$ to decide which amongst the following ones is the representation of the function.

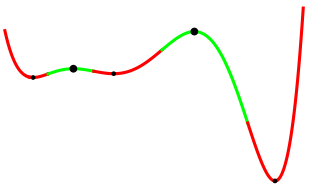
1)



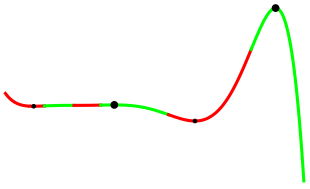
2)



3)



4)



● Big point: maximum

• Small point: minimum

Red line: convexity

Green line: concavity

Indication: To find the maximun and minimum points of the function, try (with Ruffini) the points $-2$, $-1$, $0$, $1$, $2$. To solve this exercise it is necessary to determine the increasing and decreasing intervals.

## Exercise 3

Compute the area enclosed by the function $f(x) = 300 - 125\,x - 162\,x^2 - 20\,x^3 + 6\,x^4 + x^5$ and the horizontal axis between the points $x = -4$ and $x = 7$.

1) $\frac{246\,038}{15} = 16402.5333$

2) $\frac{44\,286}{5} = 8857.2$

3) $\frac{246\,083}{15} = 16405.5333$

4) $\frac{246\,098}{15} = 16406.5333$

5) $\frac{492\,181}{30} = 16406.0333$

6) $\frac{492\,151}{30} = 16405.0333$

7) $\frac{13\,636}{3} = 4545.3333$

8) $\frac{492\,121}{30} = 16404.0333$

## Exercise 4

Compute de following matrix operations:

$$\begin{pmatrix} 1 & 0 & 1 & 0 \\ 1 & 1 & 1 & 0 \\ 1 & 0 & 2 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix} \cdot \begin{pmatrix} 0 & -1 & 0 & 0 \\ 0 & 1 & 1 & -1 \\ -1 & 0 & 1 & 1 \\ 0 & 0 & -1 & 1 \end{pmatrix} - 3 \begin{pmatrix} 2 & 1 & 2 & 2 \\ 2 & 2 & 2 & 3 \\ 0 & 0 & 1 & 0 \\ 1 & 1 & 1 & 2 \end{pmatrix}$$

1) $\begin{pmatrix} * & * & -3 & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$ 2) $\begin{pmatrix} * & * & 3 & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$ 3) $\begin{pmatrix} * & * & * & * \\ -5 & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

4) $\begin{pmatrix} * & * & * & * \\ -7 & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$ 5) $\begin{pmatrix} * & * & * & * \\ 1 & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

# Mathematics 1 - ADE - English - 2025/2026
# Final exam, Ordinary Call I - Late Enrollement - Practices, for serial number: 37

## Exercise 1

Deposits in certain investment account vary from year to year alternating gains and looses periods. We have the following data about the deposits for different years:

| year | deposits |
|---|---|
| 1 | 7 |
| 3 | 183 |
| 4 | 487 |
| 6 | 2037 |
| 7 | 3559 |

By means of a interpolation polynomial, obtain the function that yields the deposits in the account for every year t. Employ that function to forecast the exact amount for year $8$.

1) The depositis in the account for year $8$ are $8967$.

2) The depositis in the account for year $8$ are $5803$.

3) The depositis in the account for year $8$ are $5$.

4) The depositis in the account for year $8$ are $4$.

5) The depositis in the account for year $8$ are $7$.

## Exercise 2

Between the months $t=1$ and $t=9$, the true value of the shares of a company (in euros) are given by the function $C(t) = 48\,120 + 12\,960\,t - 10\,980\,t^2 + 3640\,t^3 - 510\,t^4 + 24\,t^5$.

Determine the interval whithin the value oscillates between months $t=4$ and $t=8$.

1) It oscillates between 10222 and 51266.

2) It oscillates between 10232 and 51256.

3) It oscillates between 6 and 53254.

4) It oscillates between 10232 and 51247.

5) It oscillates between 6 and 53254.

## Exercise 3

Compute the area enclosed by the function $f(x) = 180\,x - 96\,x^2 - 183\,x^3 + 99\,x^4 + 3\,x^5 - 3\,x^6$ and the horizontal axis between the points $x = -6$ and $x = 5$.

1) $\frac{1\,317\,657}{20} = 65882.85$

2) $\frac{7\,568\,033}{140} = 54057.3786$

3) $\frac{1\,714\,973}{35} = 48999.2286$

4) $\frac{1\,317\,587}{20} = 65879.35$

5) $\frac{9\,193\,217}{140} = 65665.8357$

6) $\frac{1\,317\,647}{20} = 65882.35$

7) $\frac{1\,317\,617}{20} = 65880.85$

8) $\frac{1\,317\,627}{20} = 65881.35$

## Exercise 4

Compute de following matrix operations:

$$\begin{pmatrix} 1 & 0 & 0 & 1 & -1 \\ 0 & 1 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{pmatrix} \cdot \begin{pmatrix} 1 & 1 & -1 & 0 & 0 \\ 1 & -1 & -1 & -1 & 1 \\ -1 & 1 & -1 & 1 & 0 \\ 0 & 1 & 0 & 1 & 1 \\ -1 & 0 & 0 & 1 & 1 \end{pmatrix} - 2 \begin{pmatrix} 1 & 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 1 & -2 \\ 0 & -1 & 0 & 0 & 1 \end{pmatrix}$$

1) $\begin{pmatrix} 3 & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \end{pmatrix}$

2) $\begin{pmatrix} * & * & -2 & * & * \\ * & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \end{pmatrix}$

3) $\begin{pmatrix} * & * & * & 0 & * \\ * & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \end{pmatrix}$

4) $\begin{pmatrix} * & * & * & * & * \\ * & -3 & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \end{pmatrix}$

5) $\begin{pmatrix} * & * & * & * & * \\ * & * & -4 & * & * \\ * & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \end{pmatrix}$

# Mathematics 1 - ADE - English - 2025/2026
# Final exam, Ordinary Call I - Late Enrollement - Practices, for serial number: 38

## Exercise 1

Deposits in certain investment account vary from year to year alternating gains and looses periods. We have the following data about the deposits for different years:

| year | deposits |
|---|---|
| 1 | 10 |
| 4 | 910 |
| 5 | 2142 |
| 9 | 21 170 |
| 10 | 32 032 |

By means of a interpolation polynomial, obtain the function that yields the deposits in the account for every year t. Employ that function to forecast the exact amount for year $8$.

1) The depositis in the account for year $8$ are $-5$.

2) The depositis in the account for year $8$ are $13\,338$.

3) The depositis in the account for year $8$ are $21\,170$.

4) The depositis in the account for year $8$ are $1$.

5) The depositis in the account for year $8$ are $0$.

## Exercise 2

Between the months $t=3$ and $t=12$, the true value of the shares of a company (in euros) are given by the function $C(t) = 126\,890 + 136\,080\,t - 51\,300\,t^2 + 9000\,t^3 - 750\,t^4 + 24\,t^5$.

Determine the interval whithin the value oscillates between months $t=5$ and $t=12$.

1) It oscillates between 253731 and 344611.

2) It oscillates between 253744 and 344615.

3) It oscillates between 253743 and 344623.

4) It oscillates between 253736 and 261512.

5) It oscillates between 253736 and 344618.

## Exercise 3

Compute the area enclosed by the function $f(x) = 720 + 444\,x - 480\,x^2 - 123\,x^3 + 87\,x^4 + 3\,x^5 - 3\,x^6$ and the horizontal axis between the points $x = -8$ and $x = 6$.

1) $\frac{942\,103}{2} = 471051.5$

2) $471\,053$

3) $\frac{29\,495\,219}{70} = 421360.2714$

4) $\frac{942\,105}{2} = 471052.5$

5) $\frac{1\,016\,217}{70} = 14517.3857$

6) $\frac{2\,237\,732}{5} = 447546.4$

7) $\frac{14\,039\,548}{35} = 401129.9429$

8) $\frac{942\,099}{2} = 471049.5$

## Exercise 4

Compute de following matrix operations:

$$\begin{pmatrix} 1 & 1 & -2 & 1 & 1 \\ 0 & 1 & 0 & 0 & 0 \\ -1 & -1 & 2 & -2 & -1 \\ 1 & 1 & 0 & 1 & 0 \\ 0 & 0 & -1 & 1 & 1 \end{pmatrix} \cdot \begin{pmatrix} 1 & -1 & 0 & 0 & -1 \\ -1 & -1 & 0 & 0 & -1 \\ -1 & 1 & 0 & 1 & -1 \\ -1 & 1 & -1 & -1 & 0 \\ -1 & 0 & -1 & 0 & 1 \end{pmatrix} \cdot \begin{pmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 1 & 0 & 0 \\ 0 & -1 & 0 & 0 & 0 \\ 1 & 1 & 0 & 1 & 0 \\ -1 & -1 & 0 & -1 & 1 \end{pmatrix}$$

1) $\begin{pmatrix} 1 & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \end{pmatrix}$

2) $\begin{pmatrix} -4 & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \end{pmatrix}$

3) $\begin{pmatrix} * & -6 & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \end{pmatrix}$

4) $\begin{pmatrix} * & * & -2 & * & * \\ * & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \end{pmatrix}$

5) $\begin{pmatrix} * & * & * & 2 & * \\ * & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \end{pmatrix}$

# Mathematics 1 - ADE - English - 2025/2026
# Final exam, Ordinary Call I - Late Enrollement - Practices, for serial number: 39

## Exercise 1

We deposit 15000 euros in a bank account with a continuous compound rate of 9%. At the same time every year we also add in a safe-deposit box (therefore with no interest rate) 5000 euros. How long time is it necessary until the total ammount of money (jointly in the bank account and safe-depsit box) is 61000 euros? (the solution can be found for t between 2 and 7).

1) t = **.1****

2) t = **.3****

3) t = **.5****

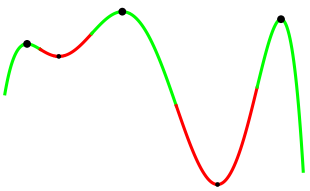
4) t = **.7****

5) t = **.9****

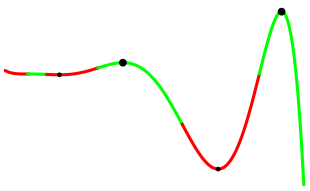
## Exercise 2

Study the shape properties of the $f(x) = 3 + 252\,000\,x - 23\,100\,x^2 - 61\,740\,x^3 - 9870\,x^4 + 2688\,x^5 + 840\,x^6 + 60\,x^7$ to decide which amongst the following ones is the representation of the function.

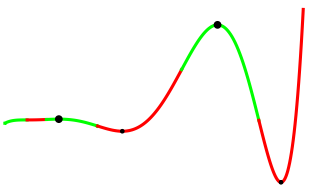
1)



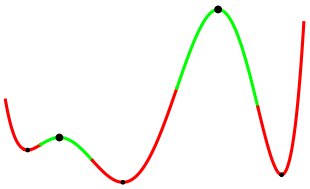
2)



3)



4)



● Big point: maximum

• Small point: minimum

Red line: convexity

Green line: concavity

Indication: To find the maximun and minimum points of the function, try (with Ruffini) the points −2, −1, 0, 1, 2. To solve this exercise it is necessary to determine the increasing and decreasing intervals.

## Exercise 3

Compute the area enclosed by the function $f(x) = -1080 + 54x + 309x^2 + 21x^3 - 21x^4 - 3x^5$ and the horizontal axis between the points $x = -7$ and $x = 1$.

1) $\frac{33342}{5} = 6668.4$

2) $\frac{33064}{5} = 6612.8$

3) $\frac{66689}{10} = 6668.9$

4) $\frac{66679}{10} = 6667.9$

5) $\frac{65389}{10} = 6538.9$

6) $\frac{33337}{5} = 6667.4$

7) $\frac{5632}{5} = 1126.4$

8) $\frac{66659}{10} = 6665.9$

## Exercise 4

Solve for the matrix X in the following equation:

$$\begin{pmatrix} 0 & 1 & 0 & -1 \\ -1 & 1 & 0 & -1 \\ 0 & 0 & 1 & 1 \\ -1 & 1 & 1 & 1 \end{pmatrix} .X. \begin{pmatrix} -1 & 1 & 0 & -1 \\ -1 & 1 & 0 & 0 \\ -1 & 0 & 1 & 0 \\ 2 & -1 & 0 & 1 \end{pmatrix}^{-1} = \begin{pmatrix} -2 & -2 & -1 & -3 \\ -3 & -2 & -1 & -4 \\ 1 & 4 & 0 & 3 \\ -1 & 4 & 0 & 1 \end{pmatrix}$$

1) $\begin{pmatrix} -2 & * & * & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$ 2) $\begin{pmatrix} * & * & -2 & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$ 3

) $\begin{pmatrix} * & * & * & * \\ 1 & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$ 4) $\begin{pmatrix} * & * & * & * \\ * & 2 & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$ 5) $\begin{pmatrix} * & * & * & * \\ * & * & 0 & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

# Mathematics 1 - ADE - English - 2025/2026
# Final exam, Ordinary Call I - Late Enrollement - Practices, for serial number: 40

## Exercise 1

Deposits in certain investment account vary from year to year alternating gains and looses periods. We have the following data about the deposits for different years:

| year | deposits |
|---|---|
| 0 | 1 |
| 3 | −107 |
| 4 | −379 |
| 6 | −2141 |
| 10 | −17 929 |

By means of a interpolation polynomial, obtain the function that yields the deposits in the account for every year t. Employ that function to forecast the exact amount for year $9$.

1) The depositis in the account for year $9$ are $8$.

2) The depositis in the account for year $9$ are $-11\,609$.

3) The depositis in the account for year $9$ are $1$.

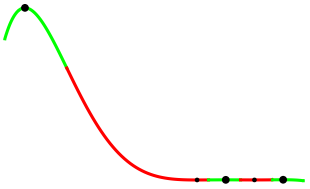
4) The depositis in the account for year $9$ are $7$.

5) The depositis in the account for year $9$ are $-17\,929$.

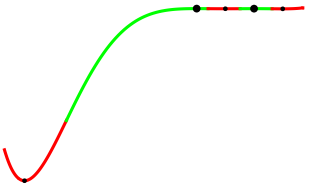
## Exercise 2

Study the shape properties of the $f(x) = 5 + 806\,400\,x - 315\,840\,x^2 + 3360\,x^3 + 19\,950\,x^4 - 2100\,x^5 - 420\,x^6 + 60\,x^7$ to decide which amongst the following ones is the representation of the function.

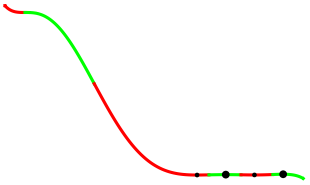
1)



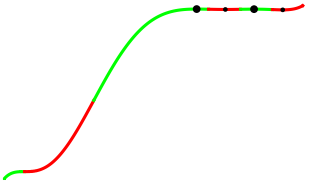
2)



3)



4)



● Big point: maximum

• Small point: minimum

Red line: convexity

Green line: concavity

Indication: To find the maximun and minimum points of the function, try (with Ruffini) the points −2, −1, 0, 1, 2. To solve this exercise it is necessary to determine the increasing and decreasing intervals.

## Exercise 3

Compute the area enclosed by the function $f(x) = 200 - 350\,x + 167\,x^2 - 11\,x^3 - 7\,x^4 + x^5$ and the horizontal axis between the points $x = -7$ and $x = 4$.

1) $\frac{260\,869}{12} = 21739.0833$

2) $\frac{89\,051}{12} = 7420.9167$

3) $\frac{1\,303\,207}{60} = 21720.1167$

4) $\frac{260\,887}{12} = 21740.5833$

5) $\frac{441\,529}{60} = 7358.8167$

6) $\frac{260\,899}{12} = 21741.5833$

7) $\frac{36\,068}{5} = 7213.6$

8) $\frac{260\,905}{12} = 21742.0833$

## Exercise 4

Compute de following matrix operations:

$$\begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ -1 & -1 & 1 & 0 \\ 0 & 1 & -1 & 1 \end{pmatrix} \cdot \left( \begin{pmatrix} 0 & -1 & -1 & 0 \\ 0 & -1 & -1 & 1 \\ -1 & 1 & 0 & 0 \\ -1 & 1 & 1 & 1 \end{pmatrix} + 3 \begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ -1 & 0 & 1 & 1 \\ 1 & -1 & 0 & 1 \end{pmatrix} \right)$$

1) $\begin{pmatrix} * & * & * & -5 \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$ 2) $\begin{pmatrix} * & * & * & * \\ -2 & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$ 3)

) $\begin{pmatrix} * & * & * & * \\ * & 2 & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$ 4) $\begin{pmatrix} * & * & * & * \\ * & * & * & 6 \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$ 5) $\begin{pmatrix} * & * & * & * \\ * & * & * & * \\ -8 & * & * & * \\ * & * & * & * \end{pmatrix}$

# Mathematics 1 - ADE - English - 2025/2026
# Final exam, Ordinary Call I - Late Enrollement - Practices, for serial number: 41

## Exercise 1

Deposits in certain investment account vary from year to year alternating gains and looses periods. We have the following data about the deposits for different years:

| year | deposits |
|---|---|
| 2 | −20 |
| 3 | −123 |
| 5 | −1085 |
| 7 | −4375 |
| 10 | −18 820 |

By means of a interpolation polynomial, obtain the function that yields the deposits in the account for every year t. Employ that function to forecast the exact amount for year $8$.

1) The depositis in the account for year $8$ are $-8$.

2) The depositis in the account for year $8$ are $-7568$.

3) The depositis in the account for year $8$ are $1$.

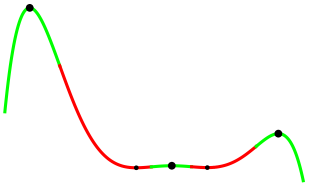
4) The depositis in the account for year $8$ are $-12\,249$.

5) The depositis in the account for year $8$ are $4$.

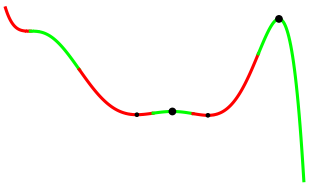
## Exercise 2

Study the shape properties of the $f(x) = 1 + 50\,400\,x - 26\,040\,x^2 - 7000\,x^3 + 6195\,x^4 + 84\,x^5 - 490\,x^6 + 60\,x^7$ to decide which amongst the following ones is the representation of the function.

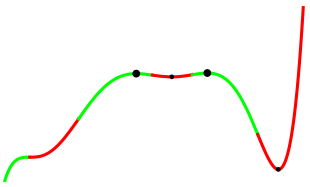
1)



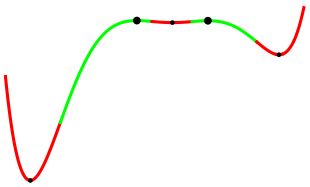
2)



3)



4)



● Big point: maximum

• Small point: minimum

Red line: convexity

Green line: concavity

Indication: To find the maximun and minimum points of the function, try (with Ruffini) the points −2, −1, 0, 1, 2. To solve this exercise it is necessary to determine the increasing and decreasing intervals.

## Exercise 3

Compute the area enclosed by the function $f(x) = 240 - 148\,x - 130\,x^2 + 30\,x^3 + 10\,x^4 - 2\,x^5$ and the horizontal axis between the points $x = -5$ and $x = 7$.

1) $\frac{27\,908}{3} = 9302.6667$

2) $\frac{55\,813}{6} = 9302.1667$

3) $\frac{24\,400}{3} = 8133.3333$

4) $\frac{27\,902}{3} = 9300.6667$

5) 5234

6) 8019

7) $\frac{55\,819}{6} = 9303.1667$

8) 0

## Exercise 4

Compute de following matrix operations:

$$\begin{pmatrix} 1 & 0 & 0 & 0 \\ -1 & 1 & 0 & -1 \\ 1 & 0 & 1 & 1 \\ 1 & 0 & 0 & 1 \end{pmatrix} \cdot \left( \begin{pmatrix} 1 & -1 & -1 & -1 \\ 0 & -1 & -1 & 0 \\ 1 & -1 & 1 & -1 \\ -1 & -1 & 1 & -1 \end{pmatrix} + 2 \begin{pmatrix} 2 & -1 & -3 & 2 \\ 0 & 1 & 0 & 0 \\ -2 & 1 & 4 & -3 \\ -3 & 2 & 4 & -2 \end{pmatrix} \right)$$

1 ) $\begin{pmatrix} * & * & * & -9 \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$ 2 ) $\begin{pmatrix} * & * & * & -7 \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$ 3 ) $\begin{pmatrix} * & * & * & 3 \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

4 ) $\begin{pmatrix} * & * & * & * \\ -5 & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$ 5 ) $\begin{pmatrix} * & * & * & * \\ * & -10 & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

# Mathematics 1 - ADE - English - 2025/2026
# Final exam, Ordinary Call I - Late Enrollement - Practices, for serial number: 42

## Exercise 1

Deposits in certain investment account vary from year to year alternating gains and looses periods. We have the following data about the deposits for different years:

| year | deposits |
|---|---|
| 0 | 0 |
| 3 | 102 |
| 6 | 1392 |
| 9 | 6786 |
| 10 | 10 280 |

By means of a interpolation polynomial, obtain the function that yields the deposits in the account for every year t. Employ that function to forecast the exact amount for year $8$.

1) The depositis in the account for year $8$ are $6786$.

2) The depositis in the account for year $8$ are $6$.

3) The depositis in the account for year $8$ are $4272$.

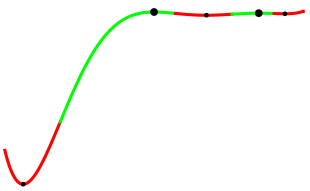
4) The depositis in the account for year $8$ are $17$.

5) The depositis in the account for year $8$ are $-6$.

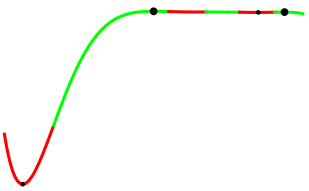
## Exercise 2

Study the shape properties of the $f(x) = 2 + 84\,000\,x^2 - 70\,000\,x^3 + 19\,320\,x^4 - 420\,x^5 - 560\,x^6 + 60\,x^7$ to decide which amongst the following ones is the representation of the function.

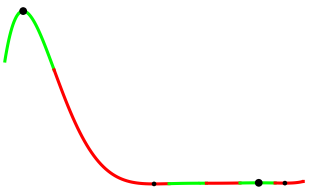
1)



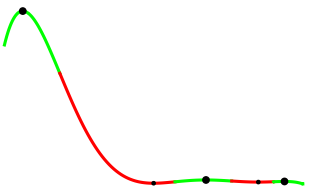
2)



3)



4)



● Big point: maximum

• Small point: minimum

Red line: convexity

Green line: concavity

Indication: To find the maximun and minimum points of the function, try (with Ruffini) the points $-2$, $-1$, $0$, $1$, $2$. To solve this exercise it is necessary to determine the increasing and decreasing intervals.

## Exercise 3

Compute the area enclosed by the function $f(x) = 320\,x + 96\,x^2 - 52\,x^3 - 6\,x^4 + 2\,x^5$ and the horizontal axis between the points $x = -5$ and $x = -2$.

1) $\frac{7584}{5} = 1516.8$

2) $\frac{7574}{5} = 1514.8$

3) $\frac{15\,153}{10} = 1515.3$

4) $\frac{7579}{5} = 1515.8$

5) $\frac{15\,143}{10} = 1514.3$

6) $\frac{2988}{5} = 597.6$

7) $\frac{15\,163}{10} = 1516.3$

8) $\frac{7564}{5} = 1512.8$

## Exercise 4

Compute de following matrix operations:

$$\begin{pmatrix} 1 & -1 & 0 & 0 \\ 1 & 0 & 0 & 0 \\ 0 & -4 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix} \cdot \begin{pmatrix} -1 & -1 & -1 & 0 \\ 1 & 0 & -1 & 0 \\ -1 & -1 & 1 & 1 \\ 0 & -1 & 0 & -1 \end{pmatrix} \cdot \begin{pmatrix} 1 & 0 & 0 & -1 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 1 & -1 & 0 & 0 \end{pmatrix}$$

1) $\begin{pmatrix} * & 4 & * & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$ 2) $\begin{pmatrix} * & * & 0 & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$ 3) $\begin{pmatrix} * & * & 4 & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

4) $\begin{pmatrix} * & * & * & 0 \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$ 5) $\begin{pmatrix} * & * & * & 1 \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

# Mathematics 1 - ADE - English - 2025/2026
# Final exam, Ordinary Call I - Late Enrollement - Practices, for serial number: 43

## Exercise 1

The funds in a bank account between the months 2 and 17 is

| t=month | Funds |
|---|---|
| 4 | 63 856 |
| 10 | −17 456 |
| 11 | −15 104 |
| 14 | 16 |
| 15 | 3664 |
| 17 | 3796 |

Along which intervals of months the deposit in the account is higher than 16 euros?

1) Along the month interval: (2, 7).

2) Along the months intervals: (2, 3) y (15, 17).

3) Along the month interval: (7, 14).

4) Along the month interval: (4, 16).

5) Along the months intervals: (2, 7) y (14, 17).

## Exercise 2

Between the months $t = 3$ and $t = 9$, the true value of the shares of a company (in euros) are given by the function $C(t) = 122\,756 + 129\,600\,t - 49\,860\,t^2 + 8920\,t^3 - 750\,t^4 + 24\,t^5$.

Determine the interval whithin the value oscillates between months $t = 4$ and $t = 8$.

1) It oscillates between 245506 and 249986.

2) It oscillates between 245496 and 249978.

3) It oscillates between 245511 and 249989.

4) It oscillates between 245510 and 249981.

5) It oscillates between 245506 and 249988.

## Exercise 3

Compute the area enclosed by the function $f(x) = -3456 + 2880\,x - 264\,x^2 - 260\,x^3 + 46\,x^4 + 5\,x^5 - x^6$ and the horizontal axis between the points $x = -5$ and $x = 3$.

1) $\frac{5\,860\,667}{210} = 27907.9381$

2) $\frac{2\,930\,386}{105} = 27908.4381$

3) $\frac{2\,930\,176}{105} = 27906.4381$

4) $\frac{2\,920\,049}{105} = 27809.9905$

5) $\frac{5\,860\,877}{210} = 27908.9381$

6) $\frac{5\,861\,087}{210} = 27909.9381$

7) $\frac{2\,930\,596}{105} = 27910.4381$

8) $\frac{2\,268\,512}{105} = 21604.8762$

## Exercise 4

Determine the values of the parameters , m , t , for which the linear system

$$(-2 + m)\,x_1 - x_2 - x_3 + x_4 == 5$$
$$(1 + t)\,x_1 + (1 + t)\,x_2 - x_4 + x_5 == -5 - 2\,t$$
$$x_1 + x_2 + x_3 - x_4 == -5$$
$$-x_1 - x_2 + x_4 == 3$$
$$-x_4 + x_5 == -3$$

has only a solution.

1) We have unique solution for $m \neq -1, t \neq -1$.

2) We have unique solution for $m \neq 1, t \neq 2$.

3) We have unique solution for $m \leq 3, t \geq 1$.

4) We have unique solution for $m \neq 1, t \neq -1$.

5) We have unique solution for $m \geq 3, t \geq -4$.

# Mathematics 1 - ADE - English - 2025/2026
# Final exam, Ordinary Call I - Late Enrollement - Practices, for serial number: 44

## Exercise 1

The funds in a bank account between the months 1 and 13 is

| t=month | Funds |
|---|---|
| 1 | 12 296 |
| 3 | −16 |
| 5 | −12 616 |
| 7 | −14 992 |
| 9 | −6616 |
| 13 | 17 624 |

Along which intervals of months the deposit in the account is below −16 euros?

1) Along the months intervals: $(1, 3)$ y $(10, 13)$ .

2) Along the months intervals: $(1, 2)$ y $(11, 13)$ .

3) Along the month interval: $(3, 11)$ .

4) Along the month interval: $(3, 10)$ .

5) Along the months intervals: $(2, 3)$ y $(11, 12)$ .

## Exercise 2

Between the months $t = 3$ and $t = 12$ , the true value of the shares of a company (in euros) are given by the function $C(t) = 462\,177 + 369\,600\,t - 107\,880\,t^2 + 14\,760\,t^3 - 960\,t^4 + 24\,t^5$ .

Determine the interval whithin the value oscillates between months $t = 6$ and $t = 11$ .

1) It oscillates between 924345 and 937953.

2) It oscillates between 924345 and 937953.

3) It oscillates between 924340 and 930168.

4) It oscillates between 924345 and 930177.

5) It oscillates between 924341 and 930183.

## Exercise 3

Compute the area enclosed by the function $f(x) = -160 + 112\,x + 154\,x^2 - 119\,x^3 + 7\,x^4 + 7\,x^5 - x^6$ and the horizontal axis between the points $x = 2$ and $x = 8$.

1) $\frac{1\,438\,236}{35} = 41092.4571$

2) $\frac{20\,291}{2} = 10145.5$

3) $\frac{8\,658\,539}{210} = 41231.1381$

4) $\frac{4\,329\,637}{105} = 41234.6381$

5) $\frac{8\,659\,169}{210} = 41234.1381$

6) $\frac{8\,658\,959}{210} = 41233.1381$

7) $\frac{8\,659\,379}{210} = 41235.1381$

8) $\frac{4\,329\,532}{105} = 41233.6381$

## Exercise 4

Determine the values of the parameters , m , t , for which the linear system

$$(-2 + m)\,x_1 + x_4 - x_5 == m$$
$$m\,x_1 + (-2 + t)\,x_2 - x_4 == -5 + m + 2\,t$$
$$-x_2 + x_3 == -1$$
$$-x_1 - x_2 + x_3 + x_4 == -1$$
$$x_1 - x_4 + x_5 == -1$$

has only a solution.

1) We have unique solution for $m \geq 0, t \leq 4$.

2) We have unique solution for $m, t \geq 5$.

3) We have unique solution for $m \neq 1, t \neq -1$.

4) We have unique solution for $m \leq 3, t \geq 4$.

5) We have unique solution for $m \neq 1, t \neq 3$.

# Mathematics 1 - ADE - English - 2025/2026
# Final exam, Ordinary Call I - Late Enrollement - Practices, for serial number: 45

## Exercise 1

The funds in a bank account between the months 2 and 16 is

| t=month | Funds |
|---|---|
| 5 | −12 317 |
| 6 | 3 |
| 7 | 13 611 |
| 12 | 51 411 |
| 13 | 45 363 |
| 16 | 3 |

Along which intervals of months the deposit in the account is higher than 3 euros?

1) Along the month interval: $(6, 16)$.

2) Along the month interval: $(2, 6)$.

3) Along the months intervals: $(2, 3)$ y $(14, 16)$.

4) Along the month interval: $(3, 15)$.

5) Along the month interval: $(2, 16)$.

## Exercise 2

Between the months $t = 0$ and $t = 6$ , the true value of the shares of a company (in euros) are given by the function $C(t) = 506 - 1800\,t^2 + 1640\,t^3 - 360\,t^4 + 24\,t^5$.

Determine the interval whithin the value oscillates between months $t = 2$ and $t = 6$.

1) It oscillates between 1434 and 10506.

2) It oscillates between 10 and 10506.

3) It oscillates between 1436 and 10508.

4) It oscillates between 1437 and 10502.

5) It oscillates between 10 and 10506.

## Exercise 3

Compute the area enclosed by the function $f(x) = 1296 - 972\,x - 504\,x^2 + 135\,x^3 + 49\,x^4 - 3\,x^5 - x^6$ and the horizontal axis between the points $x = -8$ and $x = -1$.

1) $\frac{4\,929\,343}{140} = 35209.5929$

2) $\frac{5\,375\,077}{140} = 38393.4071$

3) $\frac{635\,383}{20} = 31769.15$

4) $\frac{5\,375\,007}{140} = 38392.9071$

5) $\frac{885\,929}{70} = 12656.1286$

6) $\frac{5\,342\,431}{140} = 38160.2214$

7) $\frac{5\,374\,937}{140} = 38392.4071$

8) $\frac{5\,374\,657}{140} = 38390.4071$

## Exercise 4

Determine the values of the parameters , m , t , for which the linear system

$$(2+m)\,x_1 + x_2 - x_3 - x_4 + x_5 == 2 + 2\,m$$
$$-x_1 + (3+t)\,x_2 - x_3 + x_5 == -7 - t$$
$$x_1 + (-3-t)\,x_2 + 2\,x_3 + x_4 - x_5 == 7 + t$$
$$-x_1 + x_4 == -3$$
$$x_2 - x_3 - x_4 + x_5 == -2$$

has only a solution.

1) We have unique solution for $m \geq -5, t \geq -5$.

2) We have unique solution for $m \neq -1, t \neq 0$.

3) We have unique solution for $m \neq -2, t \neq -2$.

4) We have unique solution for $m \geq -4, t \geq 1$.

5) We have unique solution for $m \neq -2, t \neq -4$.

# Mathematics 1 - ADE - English - 2025/2026
# Final exam, Ordinary Call I - Late Enrollement - Practices, for serial number: 46

## Exercise 1

The funds in a bank account between the months 3 and 16 is

| t=month | Funds |
|---|---|
| 4 | −71 825 |
| 8 | 69 295 |
| 9 | 65 515 |
| 12 | 32 335 |
| 13 | 21 595 |
| 15 | 6715 |

Along which intervals of months the deposit in the account is higher than −5 euros?

1) Along the month interval: (3, 5).

2) Along the month interval: (5, 16).

3) Along the month interval: (3, 16).

4) Along the months intervals: (3, 4) y (14, 16).

5) Along the month interval: (5, 14).

## Exercise 2

Between the months $t = 3$ and $t = 10$, the true value of the shares of a company (in euros) are given by the function $C(t) = 744\,262 + 518\,400\,t - 130\,320\,t^2 + 16\,160\,t^3 - 990\,t^4 + 24\,t^5$.

Determine the interval whithin the value oscillates between months $t = 5$ and $t = 9$.

1) It oscillates between 1488544 and 1557286.

2) It oscillates between 1554512 and 1557286.

3) It oscillates between 1556262 and 1557286.

4) It oscillates between 1554510 and 1557289.

5) It oscillates between 1554518 and 1557296.

## Exercise 3

Compute the area enclosed by the function $f(x) = 144 + 108\,x - 136\,x^2 - 115\,x^3 - 9\,x^4 + 7\,x^5 + x^6$ and the horizontal axis between the points $x = 1$ and $x = 4$.

1) $\frac{513\,621}{140} = 3668.7214$

2) $\frac{513\,831}{140} = 3670.2214$

3) $\frac{514\,321}{140} = 3673.7214$

4) $\frac{514\,111}{140} = 3672.2214$

5) $\frac{514\,041}{140} = 3671.7214$

6) $\frac{513\,901}{140} = 3670.7214$

7) $\frac{514\,181}{140} = 3672.7214$

8) $\frac{513\,971}{140} = 3671.2214$

## Exercise 4

Determine the values of the parameters, $m$, $t$, for which the linear system

$$(-2 + m)\,x_1 + (-1 + m)\,x_2 + x_3 - x_4 + (-1 + m)\,x_5 == 0$$
$$-x_1 + (-2 + t)\,x_2 + x_3 - x_4 - x_5 == -2$$
$$-x_1 - x_2 + x_3 - x_4 - x_5 == -2$$
$$-x_1 + x_3 == 2$$
$$x_2 + x_5 == 2$$

has only a solution.

1) We have unique solution for $m \neq 1, t \neq -2$.

2) We have unique solution for $m \leq 4, t \leq 0$.

3) We have unique solution for $m \neq 1, t \neq 1$.

4) We have unique solution for $m \neq 4, t \neq 1$.

5) We have unique solution for $m \leq -1, t \geq -2$.

# Mathematics 1 - ADE - English - 2025/2026
# Final exam, Ordinary Call I - Late Enrollement - Practices, for serial number: 47

## Exercise 1

Deposits in certain investment account vary from year to year alternating gains and looses periods. We have the following data about the deposits for different years:

| year | deposits |
|---|---|
| 2 | 49 |
| 4 | 591 |
| 6 | 2829 |
| 7 | 5169 |
| 8 | 8731 |

By means of a interpolation polynomial, obtain the function that yields the deposits in the account for every year t. Employ that function to forecast the exact amount for year $9$.

1) The depositis in the account for year $9$ are $13\,881$.

2) The depositis in the account for year $9$ are $1$.

3) The depositis in the account for year $9$ are $21\,033$.

4) The depositis in the account for year $9$ are $-8$.

5) The depositis in the account for year $9$ are $12$.

## Exercise 2

Between the months $t=3$ and $t=12$, the true value of the shares of a company (in euros) are given by the function $C(t) = 744\,302 + 518\,400\,t - 130\,320\,t^2 + 16\,160\,t^3 - 990\,t^4 + 24\,t^5$.

Determine the interval whithin the value oscillates between months $t=4$ and $t=9$.

1) It oscillates between 1488584 and 1566830.

2) It oscillates between 1538158 and 1557326.

3) It oscillates between 1556302 and 1557326.

4) It oscillates between 1538167 and 1557326.

5) It oscillates between 1538156 and 1557318.

## Exercise 3

Compute the area enclosed by the function $f(x) = -10\,800 - 13\,500\,x - 5568\,x^2 - 585\,x^3 + 165\,x^4 + 45\,x^5 + 3\,x^6$ and the horizontal axis between the points $x = -8$ and $x = 5$.

1) $\frac{8\,789\,735}{28} = 313919.1071$

2) $\frac{8\,789\,721}{28} = 313918.6071$

3) $\frac{8\,789\,665}{28} = 313916.6071$

4) $\frac{1\,254\,485}{4} = 313621.25$

5) $\frac{2\,092\,569}{7} = 298938.4286$

6) $\frac{8\,785\,389}{28} = 313763.8929$

7) $\frac{7\,950\,605}{28} = 283950.1786$

8) $\frac{8\,789\,707}{28} = 313918.1071$

## Exercise 4

Compute de following matrix operations:

$$\left(\begin{pmatrix} 1 & -1 & 1 & 1 & 0 \\ 0 & 0 & -1 & -1 & -1 \\ 1 & 1 & 0 & -1 & 0 \\ -1 & 0 & -1 & 0 & 0 \\ 0 & 1 & -1 & -1 & 1 \end{pmatrix} + 3 \begin{pmatrix} 1 & 0 & 1 & 0 & -1 \\ 0 & 1 & 0 & 0 & 0 \\ -1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & -1 & 1 \end{pmatrix}\right) . \begin{pmatrix} 1 & -1 & 1 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & -1 & 0 & 1 & 0 \\ 1 & -1 & 0 & 1 & 1 \end{pmatrix}$$

1) $\begin{pmatrix} * & * & -4 & * & * \\ * & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \end{pmatrix}$

2) $\begin{pmatrix} * & * & 3 & * & * \\ * & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \end{pmatrix}$

3) $\begin{pmatrix} * & * & * & * & * \\ * & * & 4 & * & * \\ * & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \end{pmatrix}$

4) $\begin{pmatrix} * & * & * & * & * \\ * & * & -1 & * & * \\ * & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \end{pmatrix}$

5) $\begin{pmatrix} * & * & * & * & * \\ * & * & * & * & 3 \\ * & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \end{pmatrix}$

# Mathematics 1 - ADE - English - 2025/2026
# Final exam, Ordinary Call I - Late Enrollement - Practices, for serial number: 48

## Exercise 1

Deposits in certain investment account vary from year to year alternating gains and looses periods. We have the following data about the deposits for different years:

| year | deposits |
|---|---|
| 2 | −26 |
| 3 | −103 |
| 5 | −683 |
| 9 | −6739 |
| 10 | −10 218 |

By means of a interpolation polynomial, obtain the function that yields the deposits in the account for every year t. Employ that function to forecast the exact amount for year 7.

1) The depositis in the account for year 7 are −4.

2) The depositis in the account for year 7 are −4238.

3) The depositis in the account for year 7 are −2511.

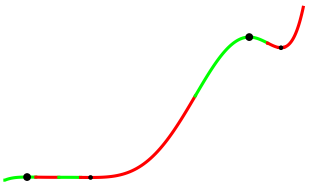
4) The depositis in the account for year 7 are 1.

5) The depositis in the account for year 7 are −6.

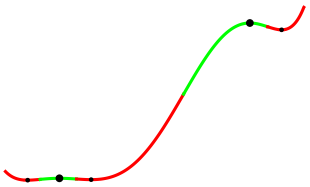
## Exercise 2

Study the shape properties of the $f(x) = 1 + 7200\,x + 4980\,x^2 + 540\,x^3 - 345\,x^4 - 36\,x^5 + 10\,x^6$ to decide which amongst the following ones is the representation of the function.

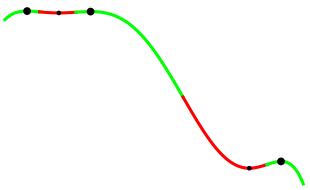
1)



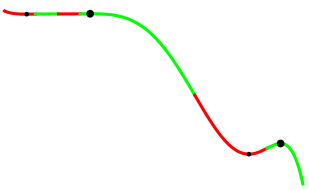
2)



3)



4)



● Big point: maximum

• Small point: minimum

Red line: convexity

Green line: concavity

Indication: To find the maximun and minimum points of the function, try (with Ruffini) the points −2, −1, 0, 1, 2. To solve this exercise it is necessary to determine the increasing and decreasing intervals.

## Exercise 3

Compute the area enclosed by the function $f(x) = 600 + 650\,x - 24\,x^2 - 76\,x^3 + 2\,x^5$ and the horizontal axis between the points $x = -3$ and $x = 0$.

1) $\frac{1849}{3} = 616.3333$

2) $\frac{3719}{6} = 619.8333$

3) $\frac{1861}{3} = 620.3333$

4) $\frac{1855}{3} = 618.3333$

5) $\frac{3713}{6} = 618.8333$

6) $\frac{1858}{3} = 619.3333$

7) 45

8) $\frac{3707}{6} = 617.8333$

## Exercise 4

Compute de following matrix operations:

$$\begin{pmatrix} 1 & 1 & 1 & 0 \\ 0 & 2 & 1 & 0 \\ 1 & 2 & 2 & 1 \\ 0 & -2 & -1 & 1 \end{pmatrix} \cdot \left( \begin{pmatrix} 0 & -1 & 1 & 0 \\ 1 & 0 & 1 & -1 \\ 1 & 1 & 0 & -1 \\ 1 & -1 & 0 & -1 \end{pmatrix} - 3 \begin{pmatrix} 1 & 2 & -2 & -2 \\ 0 & 2 & -1 & -2 \\ 0 & -1 & 1 & 1 \\ 0 & 0 & 0 & 1 \end{pmatrix} \right)$$

1) $\begin{pmatrix} -4 & * & * & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

2) $\begin{pmatrix} * & * & 8 & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

3) $\begin{pmatrix} * & * & -7 & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

4) $\begin{pmatrix} * & * & * & -11 \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

5) $\begin{pmatrix} * & * & * & * \\ 6 & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

# Mathematics 1 - ADE - English - 2025/2026
# Final exam, Ordinary Call I - Late Enrollement - Practices, for serial number: 49

## Exercise 1

Deposits in certain investment account vary from year to year alternating gains and looses periods. We have the following data about the deposits for different years:

| year | deposits |
|---|---|
| 1 | −3 |
| 3 | −97 |
| 4 | −282 |
| 6 | −1348 |
| 10 | −10 128 |

By means of a interpolation polynomial, obtain the function that yields the deposits in the account for every year t. Employ that function to forecast the exact amount for year $9$.

1) The depositis in the account for year $9$ are $16$.

2) The depositis in the account for year $9$ are $3$.

3) The depositis in the account for year $9$ are $-10\,128$.

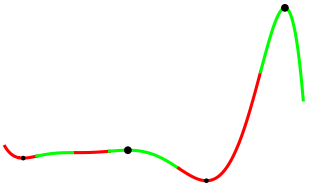
4) The depositis in the account for year $9$ are $-2$.

5) The depositis in the account for year $9$ are $-6667$.

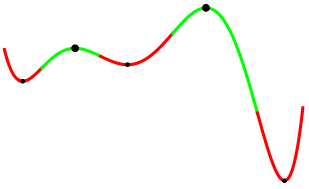
## Exercise 2

Study the shape properties of the $f(x) = 3 + 189\,000\,x + 110\,250\,x^2 - 6020\,x^3 - 15\,330\,x^4 - 2016\,x^5 + 350\,x^6 + 60\,x^7$ to decide which amongst the following ones is the representation of the function.

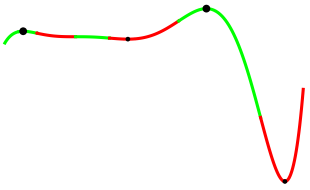
1)



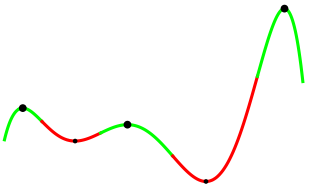
2)



3)



4)



● Big point: maximum

• Small point: minimum

Red line: convexity

Green line: concavity

Indication: To find the maximun and minimum points of the function, try (with Ruffini) the points −2, −1, 0, 1, 2. To solve this exercise it is necessary to determine the increasing and decreasing intervals.

## Exercise 3

Compute the area enclosed by the function $f(x) = -80 - 44\,x + 52\,x^2 + 7\,x^3 - 8\,x^4 + x^5$ and the horizontal axis between the points $x = -1$ and $x = 5$.

1) $\frac{3548}{15} = 236.5333$

2) $\frac{648}{5} = 129.6$

3) $\frac{7021}{30} = 234.0333$

4) $\frac{7051}{30} = 235.0333$

5) $\frac{3518}{15} = 234.5333$

6) $\frac{3533}{15} = 235.5333$

7) $\frac{3488}{15} = 232.5333$

8) $\frac{3563}{15} = 237.5333$

## Exercise 4

Compute de following matrix operations:

$$\begin{pmatrix} 1 & -3 & 1 & -2 \\ 0 & 3 & -1 & 2 \\ 0 & 1 & 0 & 1 \\ 0 & 1 & -1 & 1 \end{pmatrix} \cdot \begin{pmatrix} 0 & 1 & 1 & 0 \\ 1 & 0 & -1 & -1 \\ 0 & 1 & -1 & -1 \\ 1 & 0 & -1 & 1 \end{pmatrix} + \begin{pmatrix} 1 & -1 & 0 & -1 \\ -1 & 1 & 2 & 0 \\ -1 & 1 & 1 & 0 \\ 0 & -1 & 0 & 1 \end{pmatrix}$$

1) $\begin{pmatrix} -4 & * & * & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$ 2) $\begin{pmatrix} * & * & * & 2 \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$ 3) $\begin{pmatrix} * & * & * & * \\ * & -3 & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

4) $\begin{pmatrix} * & * & * & * \\ * & 3 & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$ 5) $\begin{pmatrix} * & * & * & * \\ * & * & -4 & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

# Mathematics 1 - ADE - English - 2025/2026
# Final exam, Ordinary Call I - Late Enrollement - Practices, for serial number: 50

## Exercise 1

Deposits in certain investment account vary from year to year alternating gains and looses periods. We have the following data about the deposits for different years:

| year | deposits |
|---|---|
| 1 | −3 |
| 3 | 93 |
| 7 | 4053 |
| 8 | 7088 |
| 10 | 17 880 |

By means of a interpolation polynomial, obtain the function that yields the deposits in the account for every year t. Employ that function to forecast the exact amount for year 9 .

1) The depositis in the account for year 9 are 11 565 .

2) The depositis in the account for year 9 are 17 880 .

3) The depositis in the account for year 9 are −4 .

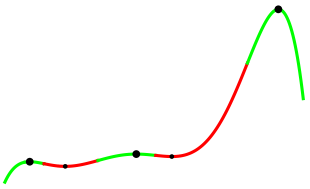
4) The depositis in the account for year 9 are 5 .

5) The depositis in the account for year 9 are 4 .

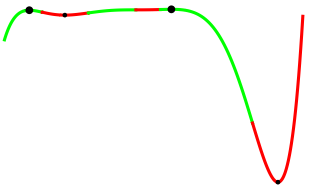
## Exercise 2

Study the shape properties of the $f(x) = 3 - 7560\,x^2 - 11\,340\,x^3 - 5250\,x^4 + 420\,x^6 + 60\,x^7$ to decide which amongst the following ones is the representation of the function.

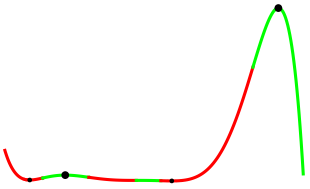
1)



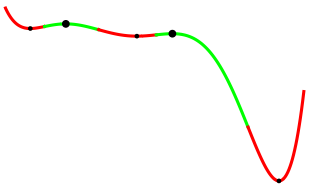
2)



3)



4)



● Big point: maximum

• Small point: minimum

Red line: convexity

Green line: concavity

Indication: To find the maximun and minimum points of the function, try (with Ruffini) the points −2, −1, 0, 1, 2. To solve this exercise it is necessary to determine the increasing and decreasing intervals.

## Exercise 3

Compute the area enclosed by the function $f(x) = 120 + 94x - 96x^2 - 92x^3 - 24x^4 - 2x^5$ and the horizontal axis between the points $x = 3$ and $x = 7$.

1) $\frac{5\,387\,821}{30} = 179594.0333$

2) $\frac{2\,693\,948}{15} = 179596.5333$

3) $\frac{2\,693\,888}{15} = 179592.5333$

4) $\frac{5\,387\,881}{30} = 179596.0333$

5) $\frac{2\,693\,918}{15} = 179594.5333$

6) $\frac{2\,693\,933}{15} = 179595.5333$

7) $\frac{5\,387\,851}{30} = 179595.0333$

8) $\frac{557\,158}{15} = 37143.8667$

## Exercise 4

Compute de following matrix operations:

$$\begin{pmatrix} 1 & 0 & 0 & 1 \\ 2 & 1 & 1 & 2 \\ 2 & 0 & 1 & 2 \\ 0 & 0 & 0 & 1 \end{pmatrix} \cdot \begin{pmatrix} -1 & -1 & -1 & -1 \\ 0 & 1 & 1 & 1 \\ 1 & -1 & 0 & -1 \\ 1 & -1 & 0 & 1 \end{pmatrix} \cdot \begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 2 \\ 0 & -2 & -1 & -1 \end{pmatrix}$$

1) $\begin{pmatrix} -1 & * & * & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

2) $\begin{pmatrix} 1 & * & * & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

3) $\begin{pmatrix} * & -2 & * & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

4) $\begin{pmatrix} * & 2 & * & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

5) $\begin{pmatrix} * & * & -3 & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

# Mathematics 1 - ADE - English - 2025/2026
# Final exam, Ordinary Call I - Late Enrollement - Practices, for serial number: 51

## Exercise 1

Deposits in certain investment account vary from year to year alternating gains and looses periods. We have the following data about the deposits for different years:

| year | deposits |
|---|---|
| 1 | −1 |
| 2 | −26 |
| 5 | −1565 |
| 8 | −11 096 |
| 9 | −18 009 |

By means of a interpolation polynomial, obtain the function that yields the deposits in the account for every year t. Employ that function to forecast the exact amount for year 4.

1) The depositis in the account for year 4 are −1565.

2) The depositis in the account for year 4 are 19.

3) The depositis in the account for year 4 are 1.

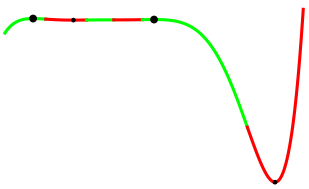
4) The depositis in the account for year 4 are −604.

5) The depositis in the account for year 4 are −2.

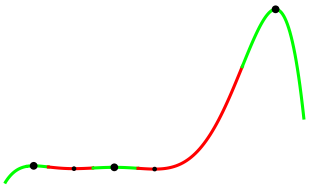
## Exercise 2

Study the shape properties of the $f(x) = 4 - 3780\,x^2 - 6300\,x^3 - 3570\,x^4 - 336\,x^5 + 280\,x^6 + 60\,x^7$ to decide which amongst the following ones is the representation of the function.

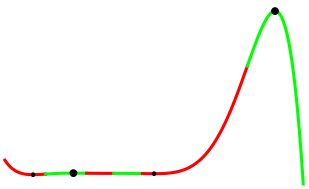
1)



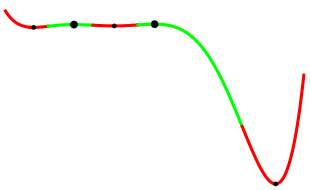
2)



3)



4)



● Big point: maximum

• Small point: minimum

Red line: convexity

Green line: concavity

Indication: To find the maximun and minimum points of the function, try (with Ruffini) the points −2, −1, 0, 1, 2. To solve this exercise it is necessary to determine the increasing and decreasing intervals.

## Exercise 3

Compute the area enclosed by the function $f(x) = 36 - 36x - 13x^2 + 13x^3 + x^4 - x^5$ and the horizontal axis between the points $x = -2$ and $x = 3$.

1) $\frac{6271}{60} = 104.5167$

2) $\frac{6241}{60} = 104.0167$

3) $\frac{6091}{60} = 101.5167$

4) $\frac{6181}{60} = 103.0167$

5) $\frac{6301}{60} = 105.0167$

6) $\frac{6211}{60} = 103.5167$

7) $\frac{6331}{60} = 105.5167$

8) $\frac{375}{4} = 93.75$

## Exercise 4

Compute de following matrix operations:

$$\left(\begin{pmatrix} 0 & 1 & 1 & 0 \\ 1 & -1 & 0 & 0 \\ -1 & -1 & 0 & 0 \\ 1 & -1 & -1 & 1 \end{pmatrix} - 3\begin{pmatrix} 1 & 0 & 1 & -1 \\ -2 & 0 & 1 & 0 \\ -2 & -1 & 2 & 0 \\ 0 & 0 & -1 & 1 \end{pmatrix}\right) \cdot \begin{pmatrix} 1 & -1 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 1 & -1 & 0 & 1 \end{pmatrix}$$

1) $\begin{pmatrix} * & * & -4 & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

2) $\begin{pmatrix} * & * & 4 & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

3) $\begin{pmatrix} * & * & * & 3 \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

4) $\begin{pmatrix} * & * & * & * \\ * & -9 & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

5) $\begin{pmatrix} * & * & * & * \\ * & -4 & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

# Mathematics 1 - ADE - English - 2025/2026
# Final exam, Ordinary Call I - Late Enrollement - Practices, for serial number: 52

## Exercise 1

The population in certain turistic area increases exponentially and is given by the function $P(t) = 94\,000\, e^{t/100}$ that indicates the number of resident citizens for every year t. At the same time, depending on the season, the city receives a variable number of tourists given by the trigonometric function $I(t) = 4000 + 3000\, \text{Sin}\left[\frac{t}{2\,\pi}\right]$ that yields the amount of visitors in the area for every moment t (t in years). Determine how many years are necessary until the total number of habitants is 138000. (the solution can be found for t between 35 and 40).

1) t = **.0****

2) t = **.2****

3) t = **.4****

4) t = **.6****

5) t = **.8****

## Exercise 2

Between the months t= 1 and t= 8, the true value of the shares of a company (in euros) are given by the function $C(t) = 13\,926 + 25\,200\, t - 14\,820\, t^2 + 4040\, t^3 - 510\, t^4 + 24\, t^5$.

Determine the interval whithin the value oscillates between months t= 1 and t= 5.

1) It oscillates between 27870 and 30685.

2) It oscillates between 27860 and 30676.

3) It oscillates between 27860 and 32998.

4) It oscillates between 27868 and 30681.

5) It oscillates between 28724 and 30676.

## Exercise 3

Compute the area enclosed by the function $f(x) = 1800 + 750\,x - 1197\,x^2 - 30\,x^3 + 120\,x^4 - 3\,x^6$ and the horizontal axis between the points $x = -1$ and $x = 5$.

1) $\frac{95\,393}{14} = 6813.7857$

2) $\frac{95\,407}{14} = 6814.7857$

3) $\frac{47\,700}{7} = 6814.2857$

4) $\frac{47\,707}{7} = 6815.2857$

5) $\frac{47\,693}{7} = 6813.2857$

6) $\frac{47\,714}{7} = 6816.2857$

7) $\frac{47\,679}{7} = 6811.2857$

8) $\frac{44\,712}{7} = 6387.4286$

## Exercise 4

Solve for the matrix X in the following equation:

$$\begin{pmatrix} 1 & 1 & 0 & 0 & -1 \\ 0 & 1 & 0 & 0 & 0 \\ -1 & 0 & 1 & 0 & 2 \\ 0 & 0 & 0 & 1 & -1 \\ -1 & 0 & 0 & 0 & 2 \end{pmatrix} .X. \begin{pmatrix} 1 & 0 & 0 & 1 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ 0 & 1 & 1 & -2 & 0 \\ 0 & 1 & 1 & -1 & 0 \\ 1 & -1 & 0 & 1 & 1 \end{pmatrix} = \begin{pmatrix} 0 & 5 & 1 & 0 & -1 \\ -2 & 3 & 1 & -3 & -1 \\ -3 & -4 & 0 & -5 & 0 \\ 2 & 0 & 0 & 3 & 1 \\ -3 & -4 & -1 & -3 & 0 \end{pmatrix}$$

1) $\begin{pmatrix} 0 & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \end{pmatrix}$

2) $\begin{pmatrix} * & * & -1 & * & * \\ * & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \end{pmatrix}$

3) $\begin{pmatrix} * & * & * & 1 & * \\ * & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \end{pmatrix}$

4) $\begin{pmatrix} * & * & * & * & * \\ 0 & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \end{pmatrix}$

5) $\begin{pmatrix} * & * & * & * & * \\ * & -2 & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \end{pmatrix}$

# Mathematics 1 - ADE - English - 2025/2026
# Final exam, Ordinary Call I - Late Enrollement - Practices, for serial number: 53

## Exercise 1

Deposits in certain investment account vary from year to year alternating gains and looses periods. We have the following data about the deposits for different years:

| year | deposits |
|---|---|
| 0 | 1 |
| 1 | −8 |
| 3 | −194 |
| 7 | −3590 |
| 10 | −13 319 |

By means of a interpolation polynomial, obtain the function that yields the deposits in the account for every year t. Employ that function to forecast the exact amount for year $2$.

1) The depositis in the account for year $2$ are $-10$.

2) The depositis in the account for year $2$ are $2$.

3) The depositis in the account for year $2$ are $-14$.

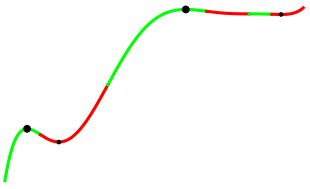
4) The depositis in the account for year $2$ are $-55$.

5) The depositis in the account for year $2$ are $-194$.

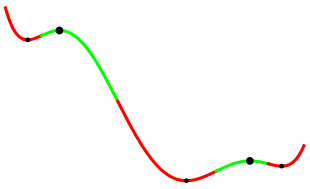
## Exercise 2

Study the shape properties of the $f(x) = 5 + 403\,200\,x - 73\,920\,x^2 - 43\,120\,x^3 + 13\,440\,x^4 + 1092\,x^5 - 700\,x^6 + 60\,x^7$ to decide which amongst the following ones is the representation of the function.

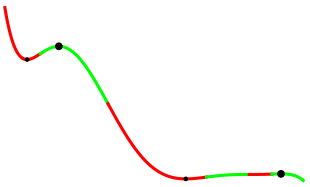
1)



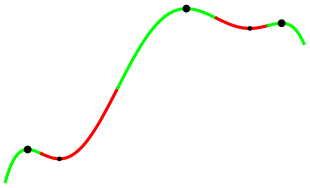
2)



3)



4)



● Big point: maximum

• Small point: minimum

Red line: convexity

Green line: concavity

Indication: To find the maximun and minimum points of the function, try (with Ruffini) the points −2, −1, 0, 1, 2. To solve this exercise it is necessary to determine the increasing and decreasing intervals.

## Exercise 3

Compute the area enclosed by the function $f(x) = 240 - 188\,x - 102\,x^2 + 46\,x^3 + 6\,x^4 - 2\,x^5$ and the horizontal axis between the points $x = -2$ and $x = 5$.

1) $\frac{35\,113}{30} = 1170.4333$

2) $\frac{35\,053}{30} = 1168.4333$

3) $\frac{17\,519}{15} = 1167.9333$

4) $\frac{17\,534}{15} = 1168.9333$

5) $\frac{35\,083}{30} = 1169.4333$

6) $\frac{7889}{10} = 788.9$

7) $\frac{17\,504}{15} = 1166.9333$

8) $\frac{34\,963}{30} = 1165.4333$

## Exercise 4

Compute de following matrix operations:

$$\left(\begin{pmatrix} 1 & -1 & 0 & 0 \\ 1 & 0 & -1 & -1 \\ 0 & 1 & 0 & -1 \\ 0 & 0 & 0 & 1 \end{pmatrix} + \begin{pmatrix} 1 & 0 & -1 & -1 \\ 1 & 0 & -1 & 0 \\ -1 & 1 & 1 & 0 \\ 0 & -1 & 1 & 0 \end{pmatrix}\right) \cdot \begin{pmatrix} 1 & 1 & 0 & 0 \\ -1 & 0 & 0 & 0 \\ -1 & -1 & 1 & 0 \\ 0 & 0 & -1 & 1 \end{pmatrix}$$

1 ) $\begin{pmatrix} * & * & 0 & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$ 2 ) $\begin{pmatrix} * & * & * & 4 \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$ 3 ) $\begin{pmatrix} * & * & * & 5 \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

4 ) $\begin{pmatrix} * & * & * & * \\ -5 & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$ 5 ) $\begin{pmatrix} * & * & * & * \\ * & -4 & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

# Mathematics 1 - ADE - English - 2025/2026
# Final exam, Ordinary Call I - Late Enrollement - Practices, for serial number: 54

## Exercise 1

The population in certain turistic area increases exponentially and is given by the function $P(t) = 96\,000\, e^{t/50}$ that indicates the number of resident citizens for every year t. At the same time, depending on the season, the city receives a variable number of tourists given by the trigonometric function $I(t) = 2000 + 1000\, \text{Sin}\left[\frac{t}{2\,\pi}\right]$ that yields the amount of visitors in the area for every moment t (t in years). Determine how many years are necessary until the total number of habitants is 118000. (the solution can be found for t between 5 and 10).

1) t = **.0****

2) t = **.2****

3) t = **.4****

4) t = **.6****

5) t = **.8****

## Exercise 2

Between the months t= 2 and t= 8, the true value of the shares of a company (in euros) are given by the function $C(t) = 18\,451 + 38\,400\, t - 20\,640\, t^2 + 5040\, t^3 - 570\, t^4 + 24\, t^5$.

Determine the interval whithin the value oscillates between months t= 4 and t= 8.

1) It oscillates between 36875 and 43199.

2) It oscillates between 36883 and 43201.

3) It oscillates between 36883 and 44659.

4) It oscillates between 36889 and 43211.

5) It oscillates between 36883 and 44659.

## Exercise 3

Compute the area enclosed by the function $f(x) = 4320 + 1224\,x - 1428\,x^2 - 450\,x^3 + 75\,x^4 + 36\,x^5 + 3\,x^6$ and the horizontal axis between the points $x = -5$ and $x = 4$.

1) $\frac{304\,889}{14} = 21777.7857$

2) $\frac{304\,875}{14} = 21776.7857$

3) $\frac{152\,448}{7} = 21778.2857$

4) $\frac{258\,795}{14} = 18485.3571$

5) $\frac{304\,833}{14} = 21773.7857$

6) $\frac{152\,434}{7} = 21776.2857$

7) $\frac{152\,441}{7} = 21777.2857$

8) $\frac{304\,861}{14} = 21775.7857$

## Exercise 4

Solve for the matrix X in the following equation:

$$\left(X - \begin{pmatrix} 2 & -2 & 0 & -1 & 1 \\ -1 & 2 & 0 & 0 & -1 \\ -1 & 0 & 1 & 0 & -1 \\ -2 & 2 & 1 & 1 & -2 \\ 1 & -1 & 0 & 0 & 1 \end{pmatrix}\right) \cdot \begin{pmatrix} 1 & 0 & 1 & 0 & 0 \\ 1 & 1 & 1 & 1 & 1 \\ 0 & 0 & 1 & 0 & 0 \\ 1 & 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 1 & 1 \end{pmatrix} = \begin{pmatrix} 1 & 1 & 0 & 1 & -1 \\ 0 & -3 & 0 & -2 & -3 \\ 0 & 1 & -2 & 0 & 1 \\ -4 & -3 & -4 & -3 & -1 \\ -1 & 2 & 0 & -1 & 0 \end{pmatrix}$$

1) $\begin{pmatrix} 2 & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \end{pmatrix}$

2) $\begin{pmatrix} * & 2 & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \end{pmatrix}$

3) $\begin{pmatrix} * & * & * & 1 & * \\ * & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \end{pmatrix}$

4) $\begin{pmatrix} * & * & * & * & -2 \\ * & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \end{pmatrix}$

5) $\begin{pmatrix} * & * & * & * & * \\ -2 & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \end{pmatrix}$

# Mathematics 1 - ADE - English - 2025/2026
# Final exam, Ordinary Call I - Late Enrollement - Practices, for serial number: 55

## Exercise 1

Deposits in certain investment account vary from year to year alternating gains and looses periods. We have the following data about the deposits for different years:

| year | deposits |
|---|---|
| 0 | 2 |
| 1 | 0 |
| 4 | −834 |
| 5 | −2008 |
| 10 | −31 068 |

By means of a interpolation polynomial, obtain the function that yields the deposits in the account for every year t. Employ that function to forecast the exact amount for year $8$.

1) The depositis in the account for year $8$ are $-4$.

2) The depositis in the account for year $8$ are $-20\,464$.

3) The depositis in the account for year $8$ are $0$.

4) The depositis in the account for year $8$ are $-12\,838$.

5) The depositis in the account for year $8$ are $14$.

## Exercise 2

Between the months $t=2$ and $t=9$, the true value of the shares of a company (in euros) are given by the function $C(t) = 7433 + 20\,160\,t - 12\,360\,t^2 + 3560\,t^3 - 480\,t^4 + 24\,t^5$.

Determine the interval whithin the value oscillates between months $t=2$ and $t=8$.

1) It oscillates between 14882 and 20746.

2) It oscillates between 14881 and 19881.

3) It oscillates between 14881 and 50849.

4) It oscillates between 14889 and 20742.

5) It oscillates between 14881 and 20745.

## Exercise 3

Compute the area enclosed by the function $f(x) = -720 - 804\,x + 168\,x^2 + 285\,x^3 + 15\,x^4 - 21\,x^5 - 3\,x^6$ and the horizontal axis between the points $x = -3$ and $x = 4$.

1) $\frac{200\,173}{28} = 7149.0357$

2) $\frac{200\,145}{28} = 7148.0357$

3) $\frac{200\,159}{28} = 7148.5357$

4) $\frac{200\,131}{28} = 7147.5357$

5) $\frac{200\,201}{28} = 7150.0357$

6) $\frac{200\,117}{28} = 7147.0357$

7) $\frac{200\,061}{28} = 7145.0357$

8) $\frac{24\,927}{4} = 6231.75$

## Exercise 4

Compute de following matrix operations:

$$\begin{pmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ 0 & -1 & 1 & 0 & -1 \\ 1 & 0 & 0 & 1 & 0 \\ -1 & 3 & 0 & 0 & 1 \end{pmatrix} \cdot \begin{pmatrix} 1 & 1 & 0 & 1 & 0 \\ -1 & 0 & 1 & -1 & 0 \\ 1 & 0 & 1 & 1 & 1 \\ 1 & -1 & 0 & -1 & 1 \\ 0 & 1 & 1 & 1 & 1 \end{pmatrix} + 2 \begin{pmatrix} 1 & 0 & -1 & -1 & 0 \\ 0 & 1 & -1 & 0 & 1 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & -1 & 0 & 1 \end{pmatrix}$$

1) $\begin{pmatrix} -3 & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \end{pmatrix}$

2) $\begin{pmatrix} 2 & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \end{pmatrix}$

3) $\begin{pmatrix} * & * & * & -3 & * \\ * & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \end{pmatrix}$

4) $\begin{pmatrix} * & * & * & * & 3 \\ * & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \end{pmatrix}$

5) $\begin{pmatrix} * & * & * & * & * \\ -1 & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \\ * & * & * & * & * \end{pmatrix}$

# Mathematics 1 - ADE - English - 2025/2026
# Final exam, Ordinary Call I - Late Enrollement - Practices, for serial number: 56

## Exercise 1

We deposit 1000 euros in a bank account with a periodic compound interes rate of 2% in 2 periods (compounding frequency). At the same time every year we also add in a safe-deposit box (therefore with no interest rate) 5000 euros. How long time is it necessary until the total ammount of money (jointly in the bank account and safe-depsit box) is 32000 euros? (the solution can be found for t between 6 and 11 ).

1) t = **.1****

2) t = **.3****

3) t = **.5****

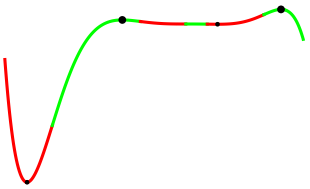
4) t = **.7****

5) t = **.9****

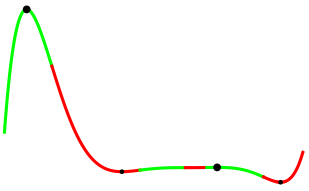
## Exercise 2

Study the shape properties of the $f(x) = 1 + 37\,800\,x^2 - 30\,240\,x^3 + 6405\,x^4 + 1260\,x^5 - 630\,x^6 + 60\,x^7$ to decide which amongst the following ones is the representation of the function.

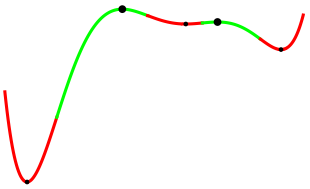
1)



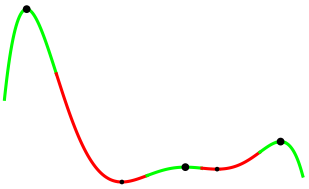
2)



3)



4)



● Big point: maximum

• Small point: minimum

Red line: convexity

Green line: concavity

Indication: To find the maximun and minimum points of the function, try (with Ruffini) the points −2, −1, 0, 1, 2. To solve this exercise it is necessary to determine the increasing and decreasing intervals.

## Exercise 3

Compute the area enclosed by the function $f(x) = 720 + 36x - 206x^2 + 14x^3 + 14x^4 - 2x^5$ and the horizontal axis between the points $x = -3$ and $x = 5$.

1) $\frac{65\,881}{30} = 2196.0333$

2) $\frac{65\,941}{30} = 2198.0333$

3) $\frac{32\,387}{15} = 2159.1333$

4) $\frac{32\,963}{15} = 2197.5333$

5) $\frac{32\,918}{15} = 2194.5333$

6) $\frac{32\,978}{15} = 2198.5333$

7) $\frac{29\,696}{15} = 1979.7333$

8) $\frac{32\,948}{15} = 2196.5333$

## Exercise 4

Solve for the matrix X in the following equation:

$$\begin{pmatrix} 0 & 0 & -1 & 1 \\ 0 & 1 & -1 & 0 \\ 0 & 0 & 1 & 0 \\ -1 & 0 & -1 & 1 \end{pmatrix} \cdot \left( X - \begin{pmatrix} 3 & 0 & -2 & 0 \\ 0 & 1 & 0 & 0 \\ -1 & 0 & 1 & 0 \\ 2 & 0 & -2 & 1 \end{pmatrix} \right) = \begin{pmatrix} -1 & 1 & 3 & -2 \\ -1 & 1 & 1 & -1 \\ 0 & -1 & -2 & 0 \\ 1 & 1 & 1 & -1 \end{pmatrix}$$

1) $\begin{pmatrix} * & -2 & * & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

2) $\begin{pmatrix} * & * & 0 & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

3) $\begin{pmatrix} * & * & 2 & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

4) $\begin{pmatrix} * & * & * & * \\ -2 & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

5) $\begin{pmatrix} * & * & * & * \\ * & * & -2 & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

# Mathematics 1 - ADE - English - 2025/2026
# Final exam, Ordinary Call I - Late Enrollement - Practices, for serial number: 57

## Exercise 1

The funds in a bank account between the months 1 and 15 is

| t=month | Funds |
|---|---|
| 2 | 14 |
| 5 | −976 |
| 6 | −1714 |
| 12 | 77 774 |
| 13 | 135 864 |
| 14 | 221 774 |

Along which intervals of months the deposit in the account is higher than 14 euros?

1) Along the months intervals: (1, 2) y (3, 8).

2) Along the months intervals: (1, 2) y (13, 15).

3) Along the month interval: (8, 15).

4) Along the months intervals: (1, 3) y (8, 15).

5) Along the months intervals: (2, 3) y (8, 15).

## Exercise 2

Between the months $t = 3$ and $t = 11$, the true value of the shares of a company (in euros) are given by the function $C(t) = 131\,127 + 158\,400\,t - 56\,040\,t^2 + 9560\,t^3 - 780\,t^4 + 24\,t^5$.

Determine the interval whithin the value oscillates between months $t = 3$ and $t = 10$.

1) It oscillates between 262291 and 304823.

2) It oscillates between 271127 and 304821.

3) It oscillates between 271133 and 304815.

4) It oscillates between 262291 and 304823.

5) It oscillates between 271127 and 304823.

## Exercise 3

Compute the area enclosed by the function $f(x) = 270 + 9x - 309x^2 - 10x^3 + 40x^4 + x^5 - x^6$ and the horizontal axis between the points $x = -7$ and $x = -4$.

1) $\frac{227900}{7} = 32557.1429$

2) $\frac{227893}{7} = 32556.1429$

3) $\frac{455751}{14} = 32553.6429$

4) $\frac{455779}{14} = 32555.6429$

5) $\frac{429561}{14} = 30682.9286$

6) $\frac{46800}{7} = 6685.7143$

7) $\frac{227886}{7} = 32555.1429$

8) $\frac{455793}{14} = 32556.6429$

## Exercise 4

Determine the values of the parameters , m , t , for which the linear system

$$(-2+m)\,x_1 - 2x_2 + x_4 - x_5 == 1 - m$$
$$-x_1 + t\,x_2 + x_3 + x_4 - x_5 == 2$$
$$(2-m)\,x_1 + 2x_2 + x_3 - x_4 + x_5 == 1 + m$$
$$-x_1 - x_2 + x_4 == 0$$
$$x_1 + 2x_2 - x_3 - x_4 + x_5 == -2$$

has only a solution.

1) We have unique solution for $m, t \leq -3$.

2) We have unique solution for $m \geq -2, t \geq 2$.

3) We have unique solution for $m \neq 1, t \neq 1$.

4) We have unique solution for $m \neq 1, t \neq 0$.

5) We have unique solution for $m \leq 4, t \leq -3$.

# Mathematics 1 - ADE - English - 2025/2026
# Final exam, Ordinary Call I - Late Enrollement - Practices, for serial number: 58

## Exercise 1

We deposit 9000 euros in a bank account with a compound interes rate of 7%. At the same time every year we also add in a safe-deposit box (therefore with no interest rate) 1000 euros. How long time is it necessary until the total ammount of money (jointly in the bank account and safe-depsit box) is 42000 euros? (the solution can be found for t between 11 and 16).

1) t = **.1****

2) t = **.3****

3) t = **.5****

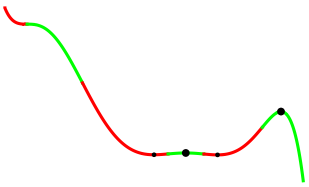
4) t = **.7****

5) t = **.9****

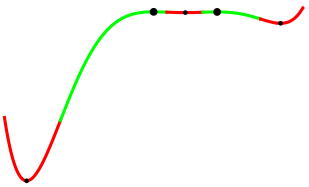
## Exercise 2

Study the shape properties of the $f(x) = 3 - 26\,880\,x^2 + 22\,400\,x^3 - 840\,x^4 - 2184\,x^5 + 70\,x^6 + 60\,x^7$ to decide which amongst the following ones is the representation of the function.

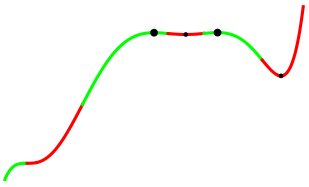
1)



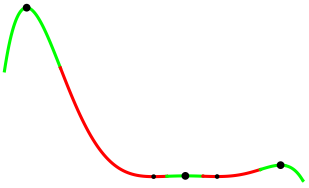
2)



3)



4)



● Big point: maximum

• Small point: minimum

Red line: convexity

Green line: concavity

Indication: To find the maximun and minimum points of the function, try (with Ruffini) the points -2, -1, 0, 1, 2. To solve this exercise it is necessary to determine the increasing and decreasing intervals.

## Exercise 3

Compute the area enclosed by the function $f(x) = -288 - 528\,x - 270\,x^2 - 15\,x^3 + 18\,x^4 + 3\,x^5$ and the horizontal axis between the points $x = 0$ and $x = 7$.

1) $\frac{1544593}{20} = 77229.65$

2) $\frac{1544613}{20} = 77230.65$

3) $\frac{105101}{10} = 10510.1$

4) $\frac{1290079}{20} = 64503.95$

5) $\frac{1544603}{20} = 77230.15$

6) $\frac{1544583}{20} = 77229.15$

7) $\frac{1544543}{20} = 77227.15$

8) $\frac{1544623}{20} = 77231.15$

## Exercise 4

Solve for the matrix X in the following equation:

$$\begin{pmatrix} 0 & 0 & 1 & -1 \\ -1 & 1 & 0 & -1 \\ -1 & 0 & 1 & -1 \\ 2 & -1 & 0 & 2 \end{pmatrix}^{-1} .X. \begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ -1 & 1 & 1 & -1 \\ -1 & -1 & 0 & 1 \end{pmatrix}^{-1} = \begin{pmatrix} 5 & 2 & 2 & 2 \\ -4 & -2 & -2 & -5 \\ -6 & -4 & -2 & -5 \\ -7 & -4 & -3 & -5 \end{pmatrix}$$

1) $\begin{pmatrix} 0 & * & * & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

2) $\begin{pmatrix} * & * & -2 & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

3) $\begin{pmatrix} * & * & -1 & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

4) $\begin{pmatrix} * & * & * & 1 \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

5) $\begin{pmatrix} * & * & * & 2 \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

# Mathematics 1 - ADE - English - 2025/2026
# Final exam, Ordinary Call I - Late Enrollement - Practices, for serial number: 59

## Exercise 1

The funds in a bank account between the months 4 and 19 is

| t=month | Funds |
|---|---|
| 7 | 3231 |
| 8 | 3351 |
| 9 | 2301 |
| 11 | −3285 |
| 14 | −7689 |
| 19 | 192 771 |

Along which intervals of months the deposit in the account is higher than −9 euros?

1) Along the months intervals: (4, 10) y (15, 19).

2) Along the month interval: (6, 17).

3) Along the months intervals: (4, 5) y (17, 19).

4) Along the month interval: (10, 15).

5) Along the month interval: (4, 19).

## Exercise 2

Between the months $t=1$ and $t=9$, the true value of the shares of a company (in euros) are given by the function $C(t) = 44\,238 + 75\,600\,t - 36\,060\,t^2 + 7400\,t^3 - 690\,t^4 + 24\,t^5$.

Determine the interval whithin the value oscillates between months $t=3$ and $t=8$.

1) It oscillates between 89488 and 96240.

2) It oscillates between 89484 and 96245.

3) It oscillates between 89487 and 96242.

4) It oscillates between 88464 and 100126.

5) It oscillates between 88464 and 100126.

## Exercise 3

Compute the area enclosed by the function $f(x) = -600 + 200\,x + 674\,x^2 - 208\,x^3 - 76\,x^4 + 8\,x^5 + 2\,x^6$ and the horizontal axis between the points $x = -3$ and $x = 5$.

1) $\frac{601\,088}{105} = 5724.6476$

2) $\frac{488\,804}{35} = 13965.8286$

3) $\frac{488\,769}{35} = 13964.8286$

4) $\frac{977\,573}{70} = 13965.3286$

5) $\frac{488\,664}{35} = 13961.8286$

6) $\frac{977\,503}{70} = 13964.3286$

7) $\frac{488\,734}{35} = 13963.8286$

8) $\frac{977\,433}{70} = 13963.3286$

## Exercise 4

Determine the values of the parameters, $m$, $t$, for which the linear system

$$
\begin{aligned}
&m\,x_1 - x_5 == 2 - 2\,m\\
&(-2 + t)\,x_2 + x_3 + x_4 + (-2 + t)\,x_5 == 5 - 2\,t\\
&t\,x_2 - x_4 + t\,x_5 == -2\,t\\
&-x_2 + x_3 + x_4 - x_5 == 3\\
&x_1 + x_5 == -4
\end{aligned}
$$

has only a solution.

1) We have unique solution for $m \neq -3, t \neq 1$.

2) We have unique solution for $m, t \geq 3$.

3) We have unique solution for $m \leq -3, t \geq -1$.

4) We have unique solution for $m \geq -4, t \geq 3$.

5) We have unique solution for $m \neq -3, t \neq 2$.

# Mathematics 1 - ADE - English - 2025/2026
# Final exam, Ordinary Call I - Late Enrollement - Practices, for serial number: 60

## Exercise 1

We deposit 19000 euros in a bank account with a continuous compound rate of 1%. At the same time every year we also add in a safe-deposit box (therefore with no interest rate) 4000 euros. How long time is it necessary until the total ammount of money (jointly in the bank account and safe-depsit box) is 43000 euros? (the solution can be found for t between 5 and 10).

1) t = **.1****

2) t = **.3****

3) t = **.5****

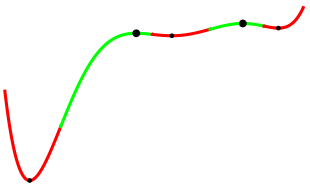
4) t = **.7****

5) t = **.9****

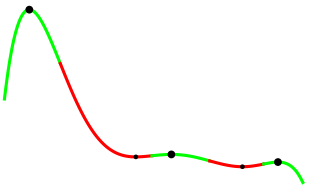
## Exercise 2

Study the shape properties of the $f(x) = 5 - 168\,000\,x + 138\,600\,x^2 - 30\,240\,x^3 - 11\,025\,x^4 + 6300\,x^5 - 1050\,x^6 + 60\,x^7$ to decide which amongst the following ones is the representation of the function.

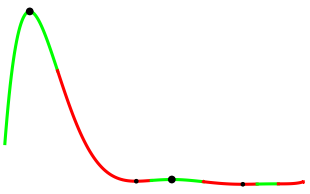
1)



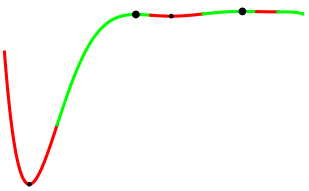
2)



3)



4)



● Big point: maximum

• Small point: minimum

Red line: convexity

Green line: concavity

Indication: To find the maximun and minimum points of the function, try (with Ruffini) the points −2, −1, 0, 1, 2. To solve this exercise it is necessary to determine the increasing and decreasing intervals.

## Exercise 3

Compute the area enclosed by the function $f(x) = -60x - 82x^2 - 14x^3 + 10x^4 + 2x^5$ and the horizontal axis between the points $x = 0$ and $x = 5$.

1) $\frac{37399}{6} = 6233.1667$

2) $\frac{18701}{3} = 6233.6667$

3) $\frac{37387}{6} = 6231.1667$

4) $\frac{18695}{3} = 6231.6667$

5) $\frac{37393}{6} = 6232.1667$

6) $\frac{30625}{6} = 5104.1667$

7) $\frac{37405}{6} = 6234.1667$

8) $\frac{37375}{6} = 6229.1667$

## Exercise 4

Solve for the matrix X in the following equation:

$$\begin{pmatrix} 0 & -1 & -1 & -1 \\ -1 & 1 & 0 & 0 \\ 1 & 2 & 2 & 2 \\ 0 & 1 & 0 & 1 \end{pmatrix} \cdot \left( X + \begin{pmatrix} 1 & 2 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & -4 & 3 & -1 \\ 0 & 3 & -2 & 1 \end{pmatrix} \right) = \begin{pmatrix} 2 & 0 & 0 & -1 \\ -1 & -2 & -2 & 1 \\ -3 & 3 & 1 & 2 \\ -1 & 3 & -2 & 1 \end{pmatrix}$$

1) $\begin{pmatrix} 0 & * & * & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

2) $\begin{pmatrix} -1 & * & * & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

3) $\begin{pmatrix} * & -2 & * & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

4) $\begin{pmatrix} * & -1 & * & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$

5) $\begin{pmatrix} * & * & 2 & * \\ * & * & * & * \\ * & * & * & * \\ * & * & * & * \end{pmatrix}$