Further Mathematics - Degree in Engineering - 2026/2027
02-Differentiation-Training written exam for serial number: 1

Exercise 1

Given the functions

$f(x,y)=(-3-2x-2x^2-y-xy-y^2,\ 3+3x+3x^2+2xy+2y^2)$

and

$g(u,v)=(1-2v,\ -3+3u+3u^2+v^2)$,

compute the determinant of the Jacobian matrix of the composition gof at the point $p=(-1,0)$.

1) 161.48

2) 35.927

3) 190.221

4) 56.5043

5) 120.

Exercise 2

Given the function

$f(x,y)=x^3+3y^3$ defined over the domain $D\equiv 6x^2+9y^2\leqslant 132$, compute its absolute maxima and minima.

1) The value of the minimum is ****.3****

2) The value of the minimum is ****.4****

3) The value of the minimum is ****.6****

4) The value of the minimum is ****.5****

5) The value of the minimum is ****.1****

Further Mathematics - Degree in Engineering - 2026/2027
02-Differentiation-Training written exam for serial number: 2

Exercise 1

Given the functions

$f(x,y)=(-3-3x-2x^2+y-y^2,\ -2+x+3x^2+y+3xy-2y^2)$

and

$g(u,v)=(-1-u-3u^2+2v+2uv-v^2,\ -2-2v+2uv+3v^2)$,

compute the determinant of the Jacobian matrix of the composition gof at the point $p=(0,0)$.

1) 1040.

2) 401.294

3) 1556.48

4) 1504.45

5) 137.351

Exercise 2

Given the function

$f(x,y)=-x^3-5y^3$ defined over the domain $D\equiv 6x^2+15y^2\leq 156$, compute its absolute maxima and minima.

1) The value of the minimum is ****.6****

2) The value of the minimum is ****.4****

3) The value of the minimum is ****.7****

4) The value of the minimum is ****.1****

5) The value of the minimum is ****.8****

Further Mathematics - Degree in Engineering - 2026/2027
02-Differentiation-Training written exam for serial number: 3

Exercise 1

Given the functions

$f(x,y)=(1+x+3x^2-2y+xy-3y^2,\ -2+x-3x^2+3y-2xy-2y^2)$

and

$g(u,v)=(2-3u+u^2+3v-2uv-v^2,\ 3-u+3u^2-uv+2v^2)$,

compute the determinant of the Jacobian matrix of the composition gof at the point $p=(-1,0)$.

1) 2448.

2) 351.336

3) 367.982

4) 627.959

5) 4529.67

Exercise 2

Given the function

$f(x,y)=-5x^3-2y^3$ defined over the domain $D\equiv 15x^2+9y^2\leq 141$, compute its absolute maxima and minima.

1) The value of the minimum is ****.8****

2) The value of the minimum is ****.5****

3) The value of the minimum is ****.0****

4) The value of the minimum is ****.7****

5) The value of the minimum is ****.2****

Further Mathematics - Degree in Engineering - 2026/2027
02-Differentiation-Training written exam for serial number: 4

Exercise 1

Given the functions

$f(x,y)=(-1+x^2-y-3xy-y^2,\ 3+2x-x^2+y-3xy-3y^2)$

and

$g(u,v)=(-2u-u^2+3v-2uv,\ -1+2u-3u^2-3v-2uv+2v^2)$,

compute the determinant of the Jacobian matrix of the composition gof at the point $p=(1,-1)$.

1) −4092.

2) −835.927

3) −2808.

4) −4943.81

5) −1083.69

Exercise 2

Given the function

$f(x,y)=-3x^3+3y^3$ defined over the domain $D\equiv 18x^2+9y^2\leqslant 324$, compute its absolute maxima and minima.

1) The value of the minimum is ****.0****

2) The value of the minimum is ****.5****

3) The value of the minimum is ****.7****

4) The value of the minimum is ****.8****

5) The value of the minimum is ****.9****

Further Mathematics - Degree in Engineering - 2026/2027
02-Differentiation-Training written exam for serial number: 5

Exercise 1

Given the functions

$f(x,y)=(2+2x+3y-xy-y^2,\ 2-x^2-2xy+2y^2)$

and

$g(u,v)=(-u-2v+3uv-2v^2,\ -1+u-2v-2uv+2v^2)$,

compute the determinant of the Jacobian matrix of the composition gof at the point $p=(0,-1)$.

1) −302.715

2) −1057.68

3) −660.

4) −1077.38

5) −901.104

Exercise 2

Given the function

$f(x,y)=-3x^3-3y^3$ defined over the domain $D\equiv 18x^2+18y^2\leqslant 576$, compute its absolute maxima and minima.

1) The value of the minimum is ****.5****

2) The value of the minimum is ****.9****

3) The value of the minimum is ****.0****

4) The value of the minimum is ****.3****

5) The value of the minimum is ****.7****

Further Mathematics - Degree in Engineering - 2026/2027
02-Differentiation-Training written exam for serial number: 6

Exercise 1

Given the functions

$f(x,y)=(3x+3x^2-3y+3xy+3y^2,\ -2-x^2-2y-2xy+2y^2)$

and

$g(u,v)=(-2+2u-3u^2+v+2uv,\ -2-u-3u^2-3v-3uv)$,

compute the determinant of the Jacobian matrix of the composition gof at the point $p=(-1,0)$.

1) 30.2855

2) 78.2784

3) 40.2788

4) 48.

5) 9.78906

Exercise 2

Given the function

$f(x,y)=4x^3+y^3$ defined over the domain $D\equiv 12x^2+3y^2\leq 60$, compute its absolute maxima and minima.

1) The value of the minimum is ****.9****

2) The value of the minimum is ****.4****

3) The value of the minimum is ****.7****

4) The value of the minimum is ****.3****

5) The value of the minimum is ****.5****

Further Mathematics - Degree in Engineering - 2026/2027
02-Differentiation-Training written exam for serial number: 7

Exercise 1

Given the functions

$f(x,y)=(1-2x-x^2-3y-2xy-2y^2,\ 1+x-3x^2+3y+2xy-2y^2)$

and

$g(u,v)=(1+3u-u^2-3v+uv,\ 2+2u+2u^2+2v-3uv)$,

compute the determinant of the Jacobian matrix of the composition gof at the point $p=(0,1)$.

1) 1050.

2) 1320.99

3) 1617.16

4) 1346.39

5) 1203.31

Exercise 2

Given the function

$f(x,y)=-5x^3-y^3$ defined over the domain $D\equiv 15x^2+9y^2\leqslant 384$, compute its absolute maxima and minima.

1) The value of the maximum is ****.6****

2) The value of the maximum is ****.2****

3) The value of the maximum is ****.3****

4) The value of the maximum is ****.4****

5) The value of the maximum is ****.5****

Further Mathematics - Degree in Engineering - 2026/2027
02-Differentiation-Training written exam for serial number: 8

Exercise 1

Given the functions

$f(x,y)=(x+2y-2xy-y^2,\ -3+2x-x^2+y-3xy-3y^2)$

and

$g(u,v)=(2+2u^2-2v+3uv-2v^2,\ -3+2u+3u^2+2v-uv+3v^2)$,

compute the determinant of the Jacobian matrix of the composition gof at the point $p=(0,1)$.

1) 388.019

2) 230.

3) 414.283

4) 353.552

5) 357.686

Exercise 2

Given the function

$f(x,y)=-4x^3+3y^3$ defined over the domain $D\equiv 30x^2+9y^2\leqslant 786$, compute its absolute maxima and minima.

1) The value of the maximum is ****.8****

2) The value of the maximum is ****.7****

3) The value of the maximum is ****.4****

4) The value of the maximum is ****.0****

5) The value of the maximum is ****.3****

Further Mathematics - Degree in Engineering - 2026/2027
02-Differentiation-Training written exam for serial number: 9

Exercise 1

Given the functions

$f(x,y)=(-3+x+2y+3xy-3y^2,\ 2+3x-2x^2-3y-2y^2)$

and

$g(u,v)=(2+3u+3u^2+v+v^2,\ -2+2u+u^2+2uv+2v^2)$,

compute the determinant of the Jacobian matrix of the composition gof at the point $p=(-1,0)$.

1) 1440.

2) 2462.45

3) 358.43

4) 887.328

5) 1993.82

Exercise 2

Given the function

$f(x,y)=-x^3+y^3$ defined over the domain $D\equiv 9x^2+6y^2\leqslant 420$, compute its absolute maxima and minima.

1) The value of the maximum is ****.4****

2) The value of the maximum is ****.6****

3) The value of the maximum is ****.3****

4) The value of the maximum is ****.8****

5) The value of the maximum is ****.0****

Further Mathematics - Degree in Engineering - 2026/2027
02-Differentiation-Training written exam for serial number: 10

Exercise 1

Given the functions

$f(x,y)=(2+2x-3x^2-3y+3y^2,\ -1+3x+2x^2+2y-3xy-2y^2)$

and

$g(u,v)=(3-2u+2u^2-3uv,\ -1+u+3u^2-2v+uv+3v^2)$,

compute the determinant of the Jacobian matrix of the composition gof at the point $p=(1,0)$.

1) −6724.78

2) −4925.

3) −3943.87

4) −6014.01

5) −6236.45

Exercise 2

Given the function

$f(x,y)=x^3-4y^3$ defined over the domain $D\equiv 3x^2+12y^2\leqslant 60$, compute its absolute maxima and minima.

1) The value of the minimum is ****.7****

2) The value of the minimum is ****.6****

3) The value of the minimum is ****.1****

4) The value of the minimum is ****.4****

5) The value of the minimum is ****.0****

Further Mathematics - Degree in Engineering - 2026/2027
02-Differentiation-Training written exam for serial number: 11

Exercise 1

Given the functions

$f(x,y)=(-2-2x-3x^2+3xy-y^2,-3+3x+x^2+3xy)$

and

$g(u,v)=(1+u+2u^2-2v-uv+3v^2,-2-2u-2v+2uv+3v^2)$,

compute the determinant of the Jacobian matrix of the composition gof at the point $p=(-1,-1)$.

1) 450.509

2) 179.601

3) 310.

4) 242.668

5) 119.641

Exercise 2

Given the function

$f(x,y)=-2x^3-4y^3$ defined over the domain $D\equiv 9x^2+12y^2\leq 129$, compute its absolute maxima and minima.

1) The value of the maximum is ****.1****

2) The value of the maximum is ****.5****

3) The value of the maximum is ****.0****

4) The value of the maximum is ****.8****

5) The value of the maximum is ****.9****

Further Mathematics - Degree in Engineering - 2026/2027
02-Differentiation-Training written exam for serial number: 12

Exercise 1

Given the functions

$f(x,y)=(-3-x+x^2-y-xy-2y^2,\ 2-x-3x^2+3y+xy)$

and

$g(u,v)=(-3-u-3v+2v^2,\ -2+2u+3v+uv-v^2)$,

compute the determinant of the Jacobian matrix of the composition gof at the point $p=(0,0)$.

1) 64.

2) 89.7975

3) 120.641

4) 51.9131

5) 81.6776

Exercise 2

Given the function

$f(x,y)=x^3+3y^3$ defined over the domain $D\equiv 3x^2+18y^2\leqslant 300$, compute its absolute maxima and minima.

1) The value of the minimum is ****.5****

2) The value of the minimum is ****.8****

3) The value of the minimum is ****.6****

4) The value of the minimum is ****.0****

5) The value of the minimum is ****.3****

Further Mathematics - Degree in Engineering - 2026/2027
02-Differentiation-Training written exam for serial number: 13

Exercise 1

Given the functions

$f(x,y)=(-2-x-2xy-y^2,-1+x^2-y+2xy-2y^2)$

and

$g(u,v)=(-2-u-3u^2+v-3uv-v^2,-2-u+2uv-v^2)$,

compute the determinant of the Jacobian matrix of the composition gof at the point $p=(0,0)$.

1) -0.739203

2) -1.8531

3) -0.350091

4) $-1.$

5) -1.56383

Exercise 2

Given the function

$f(x,y)=2x^3-4y^3$ defined over the domain $D\equiv 9x^2+18y^2\leqslant 243$, compute its absolute maxima and minima.

1) The value of the maximum is ****.5****

2) The value of the maximum is ****.1****

3) The value of the maximum is ****.0****

4) The value of the maximum is ****.9****

5) The value of the maximum is ****.6****

Further Mathematics - Degree in Engineering - 2026/2027
02-Differentiation-Training written exam for serial number: 14

Exercise 1

Given the functions

$f(x,y) = (-1 + x - x^2 + 3xy, -2x - x^2 + xy - 3y^2)$

and

$g(u,v) = (1 - 3u^2 + v - 3uv + v^2, -1 + 2u^2 - uv - v^2)$,

compute the determinant of the Jacobian matrix of the composition gof at the point $p=(-1,1)$.

1) -15574.8

2) $-31707.$

3) -27583.4

4) -4178.46

5) -23614.2

Exercise 2

Given the function

$f(x,y) = 3x^3 - 4y^3$ defined over the domain $D \equiv 27x^2 + 12y^2 \leqslant 1020$, compute its absolute maxima and minima.

1) The value of the maximum is ****.1****

2) The value of the maximum is ****.3****

3) The value of the maximum is ****.0****

4) The value of the maximum is ****.6****

5) The value of the maximum is ****.9****

Further Mathematics - Degree in Engineering - 2026/2027
02-Differentiation-Training written exam for serial number: 15

Exercise 1

Given the functions

$f(x,y)=(2-3x+x^2+2y-xy+2y^2,\ 1-x+y+2xy+y^2)$

and

$g(u,v)=(-1-3u-2u^2-v-2uv-2v^2,\ 3+3u-u^2+3uv+2v^2)$,

compute the determinant of the Jacobian matrix of the composition gof at the point $p=(1,-1)$.

1) $-360.$

2) -145.531

3) -118.691

4) -200.639

5) -452.082

Exercise 2

Given the function

$f(x,y)=-x^3-3y^3$ defined over the domain $D\equiv 3x^2+27y^2\leq 984$, compute its absolute maxima and minima.

1) The value of the maximum is $****.9****$

2) The value of the maximum is $****.7****$

3) The value of the maximum is $****.5****$

4) The value of the maximum is $****.8****$

5) The value of the maximum is $****.3****$

Further Mathematics - Degree in Engineering - 2026/2027
02-Differentiation-Training written exam for serial number: 16

Exercise 1

Given the functions

$f(x,y)=(-1+x-3x^2+xy+y^2,\ -3x-3x^2+3y-2xy)$

and

$g(u,v)=(3u-3u^2+2v+3uv-2v^2,\ -3-3u-3u^2+2v+uv-v^2)$,

compute the determinant of the Jacobian matrix of the composition gof at the point $p=(0,0)$.

1) 18.223

2) 29.4529

3) 24.0809

4) 53.9839

5) 36.

Exercise 2

Given the function

$f(x,y)=3x^3-4y^3$ defined over the domain $D\equiv 27x^2+18y^2\leqslant 1134$, compute its absolute maxima and minima.

1) The value of the minimum is ****.0****

2) The value of the minimum is ****.1****

3) The value of the minimum is ****.8****

4) The value of the minimum is ****.5****

5) The value of the minimum is ****.4****

Further Mathematics - Degree in Engineering - 2026/2027
02-Differentiation-Training written exam for serial number: 17

Exercise 1

Given the functions

$f(x,y)=(1-3x+y+3xy-2y^2,\ -1-x-3x^2+2y-xy-y^2)$

and

$g(u,v)=(-1-u-u^2+2uv-3v^2,\ -3+u+u^2+3v+3v^2)$,

compute the determinant of the Jacobian matrix of the composition gof at the point $p=(1,1)$.

1) 0.108379

2) 0.212437

3) −0.264682

4) 0.

5) 0.686311

Exercise 2

Given the function

$f(x,y)=5x^3+5y^3$ defined over the domain $D\equiv 15x^2+45y^2\leq 1680$, compute its absolute maxima and minima.

1) The value of the minimum is ****.8****

2) The value of the minimum is ****.6****

3) The value of the minimum is ****.1****

4) The value of the minimum is ****.4****

5) The value of the minimum is ****.3****

Further Mathematics - Degree in Engineering - 2026/2027
02-Differentiation-Training written exam for serial number: 18

Exercise 1

Given the functions

$f(x,y)=(x-3x^2-2y+2xy-y^2,\ -3x-2x^2-3y+2xy+2y^2)$

and

$g(u,v)=(3+3u+2u^2-v-2uv,\ -1-2u+u^2-3uv)$,

compute the determinant of the Jacobian matrix of the composition gof at the point $p=(1,0)$.

1) 19.51

2) 15.

3) 22.9106

4) 22.3779

5) 9.67767

Exercise 2

Given the function

$f(x,y)=4x^3+2y^3$ defined over the domain $D\equiv 18x^2+15y^2\leqslant 537$, compute its absolute maxima and minima.

1) The value of the maximum is ****.4****

2) The value of the maximum is ****.8****

3) The value of the maximum is ****.1****

4) The value of the maximum is ****.2****

5) The value of the maximum is ****.7****

Further Mathematics - Degree in Engineering - 2026/2027
02-Differentiation-Training written exam for serial number: 19

Exercise 1

Given the functions

$f(x,y)=(-3+2x+2x^2-y-2xy,\ -3+3x+x^2+3y+2xy-y^2)$

and

$g(u,v)=(-3-2u^2+3uv,\ 2u^2-v-3uv+2v^2)$,

compute the determinant of the Jacobian matrix of the composition gof at the point $p=(0,1)$.

1) −249.078

2) −325.

3) −360.002

4) −75.4708

5) −42.9065

Exercise 2

Given the function

$f(x,y)=x^3-3y^3$ defined over the domain $D\equiv 6x^2+18y^2\leqslant 384$, compute its absolute maxima and minima.

1) The value of the minimum is ****.3****

2) The value of the minimum is ****.7****

3) The value of the minimum is ****.1****

4) The value of the minimum is ****.4****

5) The value of the minimum is ****.6****

Further Mathematics - Degree in Engineering - 2026/2027
02-Differentiation-Training written exam for serial number: 20

Exercise 1

Given the functions

$f(x,y)=(-1+x+x^2-xy+2y^2,\ 3-x+2x^2+3xy+2y^2)$

and

$g(u,v)=(-2-3u-u^2+v+v^2,\ 1-2u+2u^2+v+uv+2v^2)$,

compute the determinant of the Jacobian matrix of the composition gof at the point $p=(-1,-1)$.

1) 1995.53

2) 8208.

3) 6583.58

4) 13 849.1

5) 7234.46

Exercise 2

Given the function

$f(x,y)=-3x^3+4y^3$ defined over the domain $D\equiv 27x^2+24y^2\leqslant 1356$, compute its absolute maxima and minima.

1) The value of the maximum is ****. 7 ****

2) The value of the maximum is ****. 5 ****

3) The value of the maximum is ****. 1 ****

4) The value of the maximum is ****. 4 ****

5) The value of the maximum is ****. 6 ****

Further Mathematics - Degree in Engineering - 2026/2027
02-Differentiation-Training written exam for serial number: 21

Exercise 1

Given the functions

$f(x,y)=(-1+3x-x^2+y+xy+y^2,\ 1-3x-3x^2-y-2xy-y^2)$

and

$g(u,v)=(2+2u-2u^2-2v+uv-2v^2,\ 1-3u-2u^2-2v-3uv-v^2)$,

compute the determinant of the Jacobian matrix of the composition gof at the point $p=(-1,0)$.

1) 3719.34

2) 1607.99

3) 1511.04

4) 1045.79

5) 2035.

Exercise 2

Given the function

$f(x,y)=-3x^3+5y^3$ defined over the domain $D\equiv 27x^2+30y^2\leqslant 1452$, compute its absolute maxima and minima.

1) The value of the minimum is ****.5****

2) The value of the minimum is ****.7****

3) The value of the minimum is ****.4****

4) The value of the minimum is ****.9****

5) The value of the minimum is ****.2****

Further Mathematics - Degree in Engineering - 2026/2027
02-Differentiation-Training written exam for serial number: 22

Exercise 1

Given the functions

$f(x,y)=(-3+2x+3y-3xy+2y^2,\ 2-3x+2x^2+3y-3xy+2y^2)$

and

$g(u,v)=(-3-u+3v+v^2,\ 3+2u-3v-3uv-2v^2)$,

compute the determinant of the Jacobian matrix of the composition gof at the point $p=(-1,1)$.

1) 192 998.

2) 134 190.

3) 189 776.

4) 167 885.

5) 227 899.

Exercise 2

Given the function

$f(x,y)=x^3+y^3$ defined over the domain $D\equiv 6x^2+6y^2\leqslant 192$, compute its absolute maxima and minima.

1) The value of the maximum is ****.8****

2) The value of the maximum is ****.9****

3) The value of the maximum is ****.0****

4) The value of the maximum is ****.6****

5) The value of the maximum is ****.1****

Further Mathematics - Degree in Engineering - 2026/2027
02-Differentiation-Training written exam for serial number: 23

Exercise 1

Given the functions

$f(x,y)=(-3-x-x^2+y+2xy-y^2,\ 1-3x-3x^2+2y-3xy+3y^2)$

and

$g(u,v)=(-2-2u+3u^2+3v-3uv,\ 3u-3u^2-2v+3uv+3v^2)$,

compute the determinant of the Jacobian matrix of the composition gof at the point $p=(-1,1)$.

1) $-107679.$

2) -92434.2

3) $-135356.$

4) $-178566.$

5) $-134929.$

Exercise 2

Given the function

$f(x,y)=x^3+5y^3$ defined over the domain $D\equiv 6x^2+15y^2\leq 156$, compute its absolute maxima and minima.

1) The value of the maximum is ****.9****

2) The value of the maximum is ****.7****

3) The value of the maximum is ****.6****

4) The value of the maximum is ****.8****

5) The value of the maximum is ****.0****

Further Mathematics - Degree in Engineering - 2026/2027
02-Differentiation-Training written exam for serial number: 24

Exercise 1

Given the functions

$f(x,y)=(-3+x-x^2+3y+3xy-y^2,\ 2+3x-2y-2xy)$

and

$g(u,v)=(-2+u-3uv+3v^2,\ 2u-u^2-2v-2uv+3v^2)$,

compute the determinant of the Jacobian matrix of the composition gof at the point $p=(-1,0)$.

1) 0.

2) −0.341316

3) 0.714633

4) −0.653601

5) 0.522097

Exercise 2

Given the function

$f(x,y)=-x^3+3y^3$ defined over the domain $D\equiv 9x^2+18y^2\leq 612$, compute its absolute maxima and minima.

1) The value of the maximum is ****.3****

2) The value of the maximum is ****.7****

3) The value of the maximum is ****.1****

4) The value of the maximum is ****.5****

5) The value of the maximum is ****.8****

Further Mathematics - Degree in Engineering - 2026/2027
02-Differentiation-Training written exam for serial number: 25

Exercise 1

Given the functions

$f(x,y)=(1-x+2x^2-3y+xy,\ 2-x-x^2+3y+2xy+y^2)$

and

$g(u,v)=(-2-3u+u^2+3v+2uv+v^2,\ -2-u-2u^2+v-2uv-3v^2)$,

compute the determinant of the Jacobian matrix of the composition gof at the point $p=(1,-1)$.

1) 53.3276

2) 150.389

3) 138.389

4) 96.

5) 116.809

Exercise 2

Given the function

$f(x,y)=5x^3+y^3$ defined over the domain $D\equiv 30x^2+9y^2\leqslant 804$, compute its absolute maxima and minima.

1) The value of the maximum is ****.9****

2) The value of the maximum is ****.5****

3) The value of the maximum is ****.7****

4) The value of the maximum is ****.6****

5) The value of the maximum is ****.3****

Further Mathematics - Degree in Engineering - 2026/2027
02-Differentiation-Training written exam for serial number: 26

Exercise 1

Given the functions

$f(x,y)=(-1-2x-3x^2-3y,\ -3+2x+x^2-3y-xy+y^2)$

and

$g(u,v)=(2+3u-2u^2+v+2uv-v^2,\ -1+2u-2v-2v^2)$,

compute the determinant of the Jacobian matrix of the composition gof at the point $p=(1,0)$.

1) −672.996

2) −981.322

3) −1408.

4) −1226.37

5) −2326.52

Exercise 2

Given the function

$f(x,y)=-3x^3+y^3$ defined over the domain $D\equiv 18x^2+9y^2\leqslant 612$, compute its absolute maxima and minima.

1) The value of the maximum is ****.4****

2) The value of the maximum is ****.5****

3) The value of the maximum is ****.0****

4) The value of the maximum is ****.7****

5) The value of the maximum is ****.6****

Further Mathematics - Degree in Engineering - 2026/2027
02-Differentiation-Training written exam for serial number: 27

Exercise 1

Given the functions

$f(x,y)=(-2-3x-2x^2-2y-3xy-3y^2,\ 2-x+x^2-y-xy+2y^2)$

and

$g(u,v)=(2-3u+3u^2+3v-uv-v^2,\ -1+2u+2v-2uv+v^2)$,

compute the determinant of the Jacobian matrix of the composition gof at the point $p=(0,-1)$.

1) 0.

2) 0.269079

3) 0.283408

4) −0.483304

5) 0.572933

Exercise 2

Given the function

$f(x,y)=2x^3+2y^3$ defined over the domain $D\equiv 3x^2+3y^2\leqslant 6$, compute its absolute maxima and minima.

1) The value of the maximum is ****.1****

2) The value of the maximum is ****.8****

3) The value of the maximum is ****.5****

4) The value of the maximum is ****.6****

5) The value of the maximum is ****.2****

Further Mathematics - Degree in Engineering - 2026/2027
02-Differentiation-Training written exam for serial number: 28

Exercise 1

Given the functions

$f(x,y)=(2+x+3x^2-2xy-3y^2,\ 3+x-x^2+3y-2xy+y^2)$

and

$g(u,v)=(-3-2u-u^2-2v-2uv+v^2,\ 3+u+3u^2-3v+3uv-2v^2)$,

compute the determinant of the Jacobian matrix of the composition gof at the point $p=(0,1)$.

1) −3569.25

2) −2772.

3) −325.323

4) −2059.02

5) −4766.55

Exercise 2

Given the function

$f(x,y)=-4x^3+y^3$ defined over the domain $D\equiv 30x^2+3y^2\leqslant 762$, compute its absolute maxima and minima.

1) The value of the minimum is ****.0****

2) The value of the minimum is ****.3****

3) The value of the minimum is ****.2****

4) The value of the minimum is ****.9****

5) The value of the minimum is ****.5****

Further Mathematics - Degree in Engineering - 2026/2027
02-Differentiation-Training written exam for serial number: 29

Exercise 1

Given the functions

$f(x,y)=(2-2x+x^2-y-xy-y^2,\ 2x+3x^2+y+xy+y^2)$

and

$g(u,v)=(-2-3u+3u^2-2v+3uv+3v^2,\ 3-2u^2+2v-uv+2v^2)$,

compute the determinant of the Jacobian matrix of the composition gof at the point $p=(-1,0)$.

1) 0.738699

2) 0.266978

3) 0.184349

4) 0.

5) -0.651261

Exercise 2

Given the function

$f(x,y)=-3x^3+3y^3$ defined over the domain $D\equiv 9x^2+27y^2\leq 1008$, compute its absolute maxima and minima.

1) The value of the minimum is ****.4****

2) The value of the minimum is ****.9****

3) The value of the minimum is ****.8****

4) The value of the minimum is ****.5****

5) The value of the minimum is ****.1****

Further Mathematics - Degree in Engineering - 2026/2027
02-Differentiation-Training written exam for serial number: 30

Exercise 1

Given the functions

$f(x,y)=(3+3x-3x^2+y-3xy-3y^2,-2+3y+xy-3y^2)$

and

$g(u,v)=(-1+3u+u^2-2v+v^2,2+2u+u^2-2v+3uv+3v^2)$,

compute the determinant of the Jacobian matrix of the composition gof at the point $p=(1,-1)$.

1) $-3080.$

2) -397.698

3) -4294.79

4) -1835.61

5) -4707.82

Exercise 2

Given the function

$f(x,y)=-5x^3+y^3$ defined over the domain $D\equiv 45x^2+3y^2\leqslant 1632$, compute its absolute maxima and minima.

1) The value of the maximum is $****.7****$

2) The value of the maximum is $****.9****$

3) The value of the maximum is $****.2****$

4) The value of the maximum is $****.1****$

5) The value of the maximum is $****.0****$

Further Mathematics - Degree in Engineering - 2026/2027
02-Differentiation-Training written exam for serial number: 31

Exercise 1

Given the functions

$f(x,y)=(2+3x+2x^2+3y+xy+3y^2,\ -1-3x+2x^2+y+xy+2y^2)$

and

$g(u,v)=(1+u^2+2v+uv-3v^2,\ 2u-3u^2+3v-v^2)$,

compute the determinant of the Jacobian matrix of the composition gof at the point $p=(1,-1)$.

1) −5016.14

2) −12644.3

3) −9000.

4) −13990.1

5) −5921.94

Exercise 2

Given the function

$f(x,y)=5x^3-3y^3$ defined over the domain $D\equiv 45x^2+18y^2\leqslant 1908$, compute its absolute maxima and minima.

1) The value of the minimum is ****.4****

2) The value of the minimum is ****.8****

3) The value of the minimum is ****.0****

4) The value of the minimum is ****.9****

5) The value of the minimum is ****.2****

Further Mathematics - Degree in Engineering - 2026/2027
02-Differentiation-Training written exam for serial number: 32

Exercise 1

Given the functions

$f(x,y)=(3x-xy-3y^2,\ -1+2x-3x^2+2y-3xy+3y^2)$

and

$g(u,v)=(2+u+2u^2+3uv-3v^2,\ -1+2u+2u^2+uv+2v^2)$,

compute the determinant of the Jacobian matrix of the composition gof at the point $p=(0,0)$.

1) 5.44734

2) 2.92204

3) 12.

4) 7.14068

5) 21.1795

Exercise 2

Given the function

$f(x,y)=-4x^3-4y^3$ defined over the domain $D\equiv 6x^2+18y^2\leqslant 168$, compute its absolute maxima and minima.

1) The value of the maximum is ****.5****

2) The value of the maximum is ****.6****

3) The value of the maximum is ****.3****

4) The value of the maximum is ****.8****

5) The value of the maximum is ****.7****

Further Mathematics - Degree in Engineering - 2026/2027
02-Differentiation-Training written exam for serial number: 33

Exercise 1

Given the functions

$f(x,y)=(3+3x+x^2-2y-2y^2,\ 1-2x-x^2-2y+3xy-3y^2)$

and

$g(u,v)=(3-2u-u^2-2v-2uv-2v^2,\ 2-u-2u^2-2v+3uv-3v^2)$,

compute the determinant of the Jacobian matrix of the composition gof at the point $p=(-1,-1)$.

1) 3447.1

2) 2260.

3) 2912.

4) 442.755

5) 3937.64

Exercise 2

Given the function

$f(x,y)=-2x^3-2y^3$ defined over the domain $D\equiv 12x^2+15y^2\leqslant 567$, compute its absolute maxima and minima.

1) The value of the maximum is ****.3****

2) The value of the maximum is ****.0****

3) The value of the maximum is ****.5****

4) The value of the maximum is ****.4****

5) The value of the maximum is ****.6****

Further Mathematics - Degree in Engineering - 2026/2027
02-Differentiation-Training written exam for serial number: 34

Exercise 1

Given the functions

$f(x,y)=(-3+2x-3x^2+y+xy+2y^2,\ 2+3x+3x^2-3y-2xy)$

and

$g(u,v)=(2-3u+2u^2+2v+uv+2v^2,\ -1-2u-2u^2-2v+3v^2)$,

compute the determinant of the Jacobian matrix of the composition gof at the point $p=(-1,1)$.

1) −1294.68

2) −1144.

3) −876.148

4) −197.313

5) −1385.94

Exercise 2

Given the function

$f(x,y)=x^3-5y^3$ defined over the domain $D\equiv 6x^2+45y^2\leq 1716$, compute its absolute maxima and minima.

1) The value of the maximum is ****.0****

2) The value of the maximum is ****.2****

3) The value of the maximum is ****.1****

4) The value of the maximum is ****.4****

5) The value of the maximum is ****.6****

Further Mathematics - Degree in Engineering - 2026/2027
02-Differentiation-Training written exam for serial number: 35

Exercise 1

Given the functions

$f(x,y)=(2+2x-x^2-3y-3xy+3y^2,3+3x^2+2y+xy-y^2)$

and

$g(u,v)=(2-u+3u^2+v+2v^2,-u-v+2uv+2v^2)$,

compute the determinant of the Jacobian matrix of the composition gof at the point $p=(-1,0)$.

1) -1688.

2) -3063.59

3) -2204.95

4) -2315.

5) -2586.83

Exercise 2

Given the function

$f(x,y)=-x^3-y^3$ defined over the domain $D\equiv 6x^2+6y^2\leqslant 192$, compute its absolute maxima and minima.

1) The value of the minimum is $****.4****$

2) The value of the minimum is $****.3****$

3) The value of the minimum is $****.6****$

4) The value of the minimum is $****.0****$

5) The value of the minimum is $****.8****$

Further Mathematics - Degree in Engineering - 2026/2027
02-Differentiation-Training written exam for serial number: 36

Exercise 1

Given the functions

$f(x,y)=(2+3x-2x^2+y-2xy-2y^2,\ 2+3x+2x^2+y+2y^2)$

and

$g(u,v)=(2+u+2u^2+2uv+2v^2,\ 2+2u-3u^2+2v-3v^2)$,

compute the determinant of the Jacobian matrix of the composition gof at the point $p=(-1,1)$.

1) −6073.85

2) −3066.95

3) −6901.02

4) −6525.62

5) −4560.

Exercise 2

Given the function

$f(x,y)=5x^3-2y^3$ defined over the domain $D\equiv 15x^2+9y^2\leq 141$, compute its absolute maxima and minima.

1) The value of the minimum is ****.7****

2) The value of the minimum is ****.9****

3) The value of the minimum is ****.3****

4) The value of the minimum is ****.8****

5) The value of the minimum is ****.0****

Further Mathematics - Degree in Engineering - 2026/2027
02-Differentiation-Training written exam for serial number: 37

Exercise 1

Given the functions

$f(x,y)=(-3-x-y-3xy-3y^2,\ 2x-y+xy+y^2)$

and

$g(u,v)=(-3-2u-u^2-v-v^2,\ 3+2u-2u^2+3v+3uv+3v^2)$,

compute the determinant of the Jacobian matrix of the composition gof at the point $p=(1,1)$.

1) 4191.59

2) 1021.61

3) 4920.54

4) 3190.

5) 1781.91

Exercise 2

Given the function

$f(x,y)=-x^3-3y^3$ defined over the domain $D\equiv 3x^2+9y^2\leqslant 48$, compute its absolute maxima and minima.

1) The value of the maximum is ****.3****

2) The value of the maximum is ****.4****

3) The value of the maximum is ****.8****

4) The value of the maximum is ****.0****

5) The value of the maximum is ****.1****

Further Mathematics - Degree in Engineering - 2026/2027
02-Differentiation-Training written exam for serial number: 38

Exercise 1

Given the functions

$f(x,y)=(2-x+3x^2-2y+2xy+3y^2,\ -3-x-x^2-2y-y^2)$

and

$g(u,v)=(1+u-2u^2+uv-3v^2,\ 2u^2+2v+uv)$,

compute the determinant of the Jacobian matrix of the composition gof at the point $p=(-1,1)$.

1) −15897.9

2) −10808.2

3) −9671.3

4) −13482.

5) −2409.25

Exercise 2

Given the function

$f(x,y)=2x^3+3y^3$ defined over the domain $D\equiv 3x^2+9y^2\leqslant 39$, compute its absolute maxima and minima.

1) The value of the maximum is ****.7****

2) The value of the maximum is ****.8****

3) The value of the maximum is ****.9****

4) The value of the maximum is ****.6****

5) The value of the maximum is ****.5****

Further Mathematics - Degree in Engineering - 2026/2027
02-Differentiation-Training written exam for serial number: 39

Exercise 1

Given the functions

$f(x,y)=(3-3x-3x^2-3y+3xy-2y^2,\ 2+x+x^2+3y-3xy+y^2)$

and

$g(u,v)=(3-3u-u^2+v-uv+v^2,\ -3-2u+3u^2-v+3uv-v^2)$,

compute the determinant of the Jacobian matrix of the composition gof at the point $p=(0,0)$.

1) 79.2318

2) 528.

3) 590.897

4) 367.96

5) 869.234

Exercise 2

Given the function

$f(x,y)=-x^3-2y^3$ defined over the domain $D\equiv 3x^2+12y^2\leqslant 204$, compute its absolute maxima and minima.

1) The value of the minimum is ****.7****

2) The value of the minimum is ****.9****

3) The value of the minimum is ****.3****

4) The value of the minimum is ****.5****

5) The value of the minimum is ****.1****

Further Mathematics - Degree in Engineering - 2026/2027
02-Differentiation-Training written exam for serial number: 40

Exercise 1

Given the functions

$f(x,y)=(-1-3x-2x^2+2y-xy-2y^2,\ -1+2x+x^2-y+2xy+y^2)$

and

$g(u,v)=(-3+u+2u^2+3v+2uv+3v^2,\ 3+u-u^2+2v-3uv-2v^2)$,

compute the determinant of the Jacobian matrix of the composition gof at the point $p=(0,0)$.

1) 7.76045

2) 6.30711

3) 26.2177

4) 8.73877

5) 15.

Exercise 2

Given the function

$f(x,y)=3x^3+2y^3$ defined over the domain $D\equiv 9x^2+6y^2\leqslant 60$, compute its absolute maxima and minima.

1) The value of the minimum is ****.5****

2) The value of the minimum is ****.2****

3) The value of the minimum is ****.1****

4) The value of the minimum is ****.3****

5) The value of the minimum is ****.8****

Further Mathematics - Degree in Engineering - 2026/2027
02-Differentiation-Training written exam for serial number: 41

Exercise 1

Given the functions

$f(x,y) = (-1 + x - x^2 + 2y + 2y^2, -2x - 3x^2 - 3y^2)$

and

$g(u,v) = (3 + 3u + 3u^2 - v - uv + 3v^2, -2 - 3u - 3u^2 - 3v + 2uv - v^2)$,

compute the determinant of the Jacobian matrix of the composition gof at the point $p=(1,-1)$.

1) 7741.72

2) 16 210.6

3) 3070.67

4) 5138.17

5) 12 518.

Exercise 2

Given the function

$f(x,y) = 3x^3 + 5y^3$ defined over the domain $D \equiv 18x^2 + 30y^2 \leqslant 768$, compute its absolute maxima and minima.

1) The value of the maximum is ****.1****

2) The value of the maximum is ****.0****

3) The value of the maximum is ****.4****

4) The value of the maximum is ****.9****

5) The value of the maximum is ****.2****

Further Mathematics - Degree in Engineering - 2026/2027
02-Differentiation-Training written exam for serial number: 42

Exercise 1

Given the functions

$f(x,y)=(-1+x+2xy+y^2,-2+3x-y-2xy-y^2)$

and

$g(u,v)=(2-3u-u^2-v-3uv,3-u+u^2-v+uv+2v^2)$,

compute the determinant of the Jacobian matrix of the composition gof at the point $p=(0,1)$.

1) 2379.81

2) 536.46

3) 1989.36

4) 2419.21

5) 1738.

Exercise 2

Given the function

$f(x,y)=3x^3+4y^3$ defined over the domain $D\equiv 27x^2+18y^2\leqslant 1134$, compute its absolute maxima and minima.

1) The value of the maximum is ****.4****

2) The value of the maximum is ****.2****

3) The value of the maximum is ****.1****

4) The value of the maximum is ****.3****

5) The value of the maximum is ****.6****

Further Mathematics - Degree in Engineering - 2026/2027
02-Differentiation-Training written exam for serial number: 43

Exercise 1

Given the functions

$f(x,y)=(-2+3x-2x^2+y+2xy-3y^2,\ 3-3x+y-xy-2y^2)$

and

$g(u,v)=(1-3u-2v+2uv+v^2,\ 2-2u-u^2+v-3uv-2v^2)$,

compute the determinant of the Jacobian matrix of the composition gof at the point $p=(1,0)$.

1) −25.0014

2) −148.858

3) −185.251

4) −108.

5) −190.162

Exercise 2

Given the function

$f(x,y)=2x^3-5y^3$ defined over the domain $D\equiv 3x^2+30y^2\leqslant 483$, compute its absolute maxima and minima.

1) The value of the minimum is ****.0****

2) The value of the minimum is ****.7****

3) The value of the minimum is ****.8****

4) The value of the minimum is ****.2****

5) The value of the minimum is ****.4****

Further Mathematics - Degree in Engineering - 2026/2027
02-Differentiation-Training written exam for serial number: 44

Exercise 1

Given the functions

$f(x,y)=(2-2x+x^2+2y-xy+2y^2,\ 2-x+3x^2-3y-3xy-3y^2)$

and

$g(u,v)=(2+u-u^2-3v+3uv+3v^2,\ 3+3u-2u^2-v-uv-2v^2)$,

compute the determinant of the Jacobian matrix of the composition gof at the point $p=(0,0)$.

1) 86.6487

2) 576.

3) 293.013

4) 285.755

5) 282.733

Exercise 2

Given the function

$f(x,y)=-2x^3-3y^3$ defined over the domain $D\equiv 15x^2+18y^2\leqslant 663$, compute its absolute maxima and minima.

1) The value of the minimum is ****.9****

2) The value of the minimum is ****.6****

3) The value of the minimum is ****.0****

4) The value of the minimum is ****.1****

5) The value of the minimum is ****.4****

Further Mathematics - Degree in Engineering - 2026/2027
02-Differentiation-Training written exam for serial number: 45

Exercise 1

Given the functions

$f(x,y)=(-3+2x+x^2+y-2xy,\ 3+3x+y+xy+y^2)$

and

$g(u,v)=(3-2u+u^2-3uv+2v^2,\ -2+u^2+3v-2v^2)$,

compute the determinant of the Jacobian matrix of the composition gof at the point $p=(1,1)$.

1) 13212.

2) 17446.3

3) 15183.8

4) 17788.9

5) 24084.3

Exercise 2

Given the function

$f(x,y)=x^3+5y^3$ defined over the domain $D\equiv 6x^2+30y^2\leqslant 576$, compute its absolute maxima and minima.

1) The value of the minimum is ****.3****

2) The value of the minimum is ****.1****

3) The value of the minimum is ****.5****

4) The value of the minimum is ****.6****

5) The value of the minimum is ****.8****

Further Mathematics - Degree in Engineering - 2026/2027
02-Differentiation-Training written exam for serial number: 46

Exercise 1

Given the functions

$f(x,y)=(1+2x+3x^2-y+2xy+y^2,\ 3x-3x^2+y+3xy-3y^2)$

and

$g(u,v)=(u+u^2+3v^2,\ 2-u-2u^2-v^2)$,

compute the determinant of the Jacobian matrix of the composition gof at the point $p=(1,0)$.

1) 0.614922

2) −0.734858

3) 0.750278

4) 0.640992

5) 0.

Exercise 2

Given the function

$f(x,y)=5x^3+3y^3$ defined over the domain $D\equiv 45x^2+18y^2\leqslant 1908$, compute its absolute maxima and minima.

1) The value of the minimum is ****.2****

2) The value of the minimum is ****.7****

3) The value of the minimum is ****.8****

4) The value of the minimum is ****.0****

5) The value of the minimum is ****.1****

Further Mathematics - Degree in Engineering - 2026/2027
02-Differentiation-Training written exam for serial number: 47

Exercise 1

Given the functions

$f(x,y)=(2+2x-3x^2+2y+3xy+2y^2,\ 1-3x^2-3y+2xy+y^2)$

and

$g(u,v)=(-3-2u-3u^2+v-2uv,\ -1+3u+3u^2-3uv-3v^2)$,

compute the determinant of the Jacobian matrix of the composition gof at the point $p=(0,1)$.

1) -7276.98

2) $-15198.$

3) -28110.4

4) -7802.31

5) -19811.6

Exercise 2

Given the function

$f(x,y)=-x^3+5y^3$ defined over the domain $D\equiv 3x^2+30y^2\leqslant 492$, compute its absolute maxima and minima.

1) The value of the minimum is $****.2****$

2) The value of the minimum is $****.8****$

3) The value of the minimum is $****.0****$

4) The value of the minimum is $****.4****$

5) The value of the minimum is $****.6****$

Further Mathematics - Degree in Engineering - 2026/2027
02-Differentiation-Training written exam for serial number: 48

Exercise 1

Given the functions

$f(x,y)=(-1+x+2x^2-3xy-2y^2,\ 3-3x-2x^2+2y-2y^2)$

and

$g(u,v)=(-3u-3v+3uv+v^2,\ -1+u+3u^2+2v+2uv+3v^2)$,

compute the determinant of the Jacobian matrix of the composition gof at the point $p=(-1,0)$.

1) $-1701.$

2) -264.47

3) -380.941

4) -2848.42

5) -1008.4

Exercise 2

Given the function

$f(x,y)=3x^3-4y^3$ defined over the domain $D\equiv 9x^2+6y^2\leqslant 42$, compute its absolute maxima and minima.

1) The value of the minimum is $****.0****$

2) The value of the minimum is $****.6****$

3) The value of the minimum is $****.7****$

4) The value of the minimum is $****.2****$

5) The value of the minimum is $****.9****$

Further Mathematics - Degree in Engineering - 2026/2027
02-Differentiation-Training written exam for serial number: 49

Exercise 1

Given the functions

$f(x,y)=(1+x-2x^2+xy+3y^2,\ 1-3x+2x^2-2y+2xy+2y^2)$

and

$g(u,v)=(1-u^2-v-v^2,\ -2-3u+u^2+2uv)$,

compute the determinant of the Jacobian matrix of the composition gof at the point $p=(-1,0)$.

1) $-1323.$

2) -968.294

3) -690.457

4) -2383.55

5) -531.077

Exercise 2

Given the function

$f(x,y)=-5x^3+4y^3$ defined over the domain $D\equiv 45x^2+30y^2\leqslant 2370$, compute its absolute maxima and minima.

1) The value of the maximum is $****.7****$

2) The value of the maximum is $****.9****$

3) The value of the maximum is $****.0****$

4) The value of the maximum is $****.4****$

5) The value of the maximum is $****.6****$

Further Mathematics - Degree in Engineering - 2026/2027
02-Differentiation-Training written exam for serial number: 50

Exercise 1

Given the functions

$f(x,y)=(1+x-x^2-y-3xy-2y^2,\ -2-2x+3x^2+y+2xy-2y^2)$

and

$g(u,v)=(2-u^2-2uv-2v^2,\ 2+v-v^2)$,

compute the determinant of the Jacobian matrix of the composition gof at the point $p=(0,1)$.

1) 686.24

2) 595.971

3) 567.315

4) 420.

5) 47.4294

Exercise 2

Given the function

$f(x,y)=-5x^3+3y^3$ defined over the domain $D\equiv 15x^2+27y^2\leq 1032$, compute its absolute maxima and minima.

1) The value of the maximum is ****.0****

2) The value of the maximum is ****.3****

3) The value of the maximum is ****.5****

4) The value of the maximum is ****.2****

5) The value of the maximum is ****.1****