Further Mathematics - Degree in Engineering - 2025/2026
5-Fourier-PDE-Handwritten-training for serial number: 1

Exercise 1

$$\begin{cases} \frac{\partial^2 u}{\partial t^2}(x,t) = 9\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<1,\ 0<t \\ u(0,t) = u(1,t) = 0 & 0 \le t \\ u(x,0) = -\sin(\pi x) & 0 \le x \le 1 \\ \frac{\partial}{\partial t}u(x,0) = -5\sin(6\pi x) & 0. \le x \le 1 \\ 0 & \text{True} \end{cases}$$

Compute the position of the string at $x = \frac{7}{10}$ and the moment $t = 0.007$.

1) $u\left(\frac{7}{10}, 0.007\right) =$ ***.4***

2) $u\left(\frac{7}{10}, 0.007\right) =$ ***.5***

3) $u\left(\frac{7}{10}, 0.007\right) =$ ***.8***

4) $u\left(\frac{7}{10}, 0.007\right) =$ ***.0***

5) $u\left(\frac{7}{10}, 0.007\right) =$ ***.1***

Exercise 2

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = 9\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<1,\ 0<t \\ \frac{\partial u}{\partial x}(0,t) = \frac{\partial u}{\partial x}(1,t) = 0 & 0 \le t \\ u(x,0) = x^2 & 0 \le x \le 1 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x = \frac{1}{10}$

and the moment $t = 0.002$ by means of a Fourier series of order 1 .

1) $u\left(\frac{1}{10}, 0.002\right) =$ ***.*0**

2) $u\left(\frac{1}{10}, 0.002\right) =$ ***.*1**

3) $u\left(\frac{1}{10}, 0.002\right) =$ ***.*9**

4) $u\left(\frac{1}{10}, 0.002\right) =$ ***.*5**

5) $u\left(\frac{1}{10}, 0.002\right) =$ ***.*8**

Further Mathematics - Degree in Engineering - 2025/2026
5-Fourier-PDE-Handwritten-training for serial number: 2

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = 4\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<5,\ 0<t \\ \frac{\partial u}{\partial x}(0,t) = \frac{\partial u}{\partial x}(5,t) = 0 & 0 \le t \\ u(x,0) = -2\cos\left(\frac{2\pi x}{5}\right) - 7\cos(\pi x) & 0 \le x \le 5 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 2 and the moment t= 0.008 .

1) u(2 , 0.008) = **7.****

2) u(2 , 0.008) = **3.****

3) u(2 , 0.008) = **0.****

4) u(2 , 0.008) = **2.****

5) u(2 , 0.008) = **5.****

Exercise 2

$$\begin{cases} \frac{\partial^3 u}{\partial t^3}(x,t) = 4\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<5,\ 0<t \\ u(0,t) = u(5,t) = 0,\ \lim_{t\to\infty} u(x,t) = 0 & 0 \le t \\ u(x,0) = x^2 & 0 \le x \le 5 \\ 0 & \text{True} \end{cases}$$

Compute the value of the solution of this boundary problem at the point x= 1 , t= 0.002 , by separation of variables by means of a Fourier series of order 1.

1) u(1 , 0.002) = **3.****

2) u(1 , 0.002) = **5.****

3) u(1 , 0.002) = **7.****

4) u(1 , 0.002) = **8.****

5) u(1 , 0.002) = **2.****

Further Mathematics - Degree in Engineering - 2025/2026
5-Fourier-PDE-Handwritten-training for serial number: 3

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = \frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<4,\ 0<t \\ u(0,t) = u(4,t) = 0 & 0 \le t \\ u(x,0) = 9\sin\left(\frac{5\pi x}{4}\right) - 9\sin(\pi x) & 0 \le x \le 4 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 3 and the moment t= 0.006 .

1) u(3 , 0.006) = **7.****

2) u(3 , 0.006) = **5.****

3) u(3 , 0.006) = **0.****

4) u(3 , 0.006) = **6.****

5) u(3 , 0.006) = **8.****

Exercise 2

$$\begin{cases} \frac{\partial^3 u}{\partial t^3}(x,t) = \frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<4,\ 0<t \\ u(0,t) = u(4,t) = 0,\ \lim_{t\to\infty} u(x,t) = 0 & 0 \le t \\ u(x,0) = x^2 & 0 \le x \le 4 \\ 0 & \text{True} \end{cases}$$

Compute the value of the solution of this boundary problem at the point x= 1 , t= 0.005 , by separation of variables by means of a Fourier series of order 1.

1) u(1 , 0.005) = **6.****

2) u(1 , 0.005) = **4.****

3) u(1 , 0.005) = **2.****

4) u(1 , 0.005) = **9.****

5) u(1 , 0.005) = **7.****

Further Mathematics - Degree in Engineering - 2025/2026
5-Fourier-PDE-Handwritten-training for serial number: 4

Exercise 1

$$\begin{cases} \frac{\partial^2 u}{\partial t^2}(x,t) = 9\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<5,\ 0<t \\ u(0,t) = u(5,t) = 0 & 0 \le t \\ u(x,0) = -7\sin\left(\frac{2\pi x}{5}\right) & 0 \le x \le 5 \\ \frac{\partial}{\partial t}u(x,0) = -9\sin\left(\frac{3\pi x}{5}\right) & 0. \le x \le 5 \\ 0 & \text{True} \end{cases}$$

Compute the position of the string at $x = 3$ and the moment $t = 0.005$.

1) $u(3, 0.005) = **2.****$

2) $u(3, 0.005) = **0.****$

3) $u(3, 0.005) = **6.****$

4) $u(3, 0.005) = **1.****$

5) $u(3, 0.005) = **4.****$

Exercise 2

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = 9\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<5,\ 0<t \\ \frac{\partial u}{\partial x}(0,t) = \frac{\partial u}{\partial x}(5,t) = 0 & 0 \le t \\ u(x,0) = x^2 & 0 \le x \le 5 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x = 4$
and the moment $t = 0.006$ by means of a Fourier series of order 1 .

1) $u(4, 0.006) = *3*.****$

2) $u(4, 0.006) = *1*.****$

3) $u(4, 0.006) = *8*.****$

4) $u(4, 0.006) = *6*.****$

5) $u(4, 0.006) = *2*.****$

Further Mathematics - Degree in Engineering - 2025/2026
5-Fourier-PDE-Handwritten-training for serial number: 5

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = \frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t) = u(\pi,t) = 0 & 0 \le t \\ u(x,0) = 2\sin(2x) - 6\sin(4x) & 0 \le x \le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x = 2$ and the moment $t = 0.004$.

1) $u(2, 0.004) = **8.****$

2) $u(2, 0.004) = **7.****$

3) $u(2, 0.004) = **4.****$

4) $u(2, 0.004) = **2.****$

5) $u(2, 0.004) = **9.****$

Exercise 2

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = \frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t) = u(\pi,t) = 0 & 0 \le t \\ u(x,0) = x^2 & 0 \le x \le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x = 2$
and the moment $t = 0.007$ by means of a Fourier series of order 1 .

1) $u(2, 0.007) = **3.****$

2) $u(2, 0.007) = **8.****$

3) $u(2, 0.007) = **5.****$

4) $u(2, 0.007) = **6.****$

5) $u(2, 0.007) = **9.****$

Further Mathematics - Degree in Engineering - 2025/2026
5-Fourier-PDE-Handwritten-training for serial number: 6

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = \frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<1,\ 0<t \\ u(0,t) = u(1,t) = 0 & 0 \le t \\ u(x,0) = -5\sin(2\pi x) - 5\sin(7\pi x) & 0 \le x \le 1 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x = \frac{7}{10}$ and the moment $t = 0.001$.

1) $u\left(\frac{7}{10}, 0.001\right) = **9.****$

2) $u\left(\frac{7}{10}, 0.001\right) = **1.****$

3) $u\left(\frac{7}{10}, 0.001\right) = **7.****$

4) $u\left(\frac{7}{10}, 0.001\right) = **5.****$

5) $u\left(\frac{7}{10}, 0.001\right) = **3.****$

Exercise 2

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = \frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<1,\ 0<t \\ u(0,t) = u(1,t) = 0 & 0 \le t \\ u(x,0) = x & 0 \le x \le 1 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x = \frac{9}{10}$

and the moment $t = 0.01$ by means of a Fourier series of order 2 .

1) $u\left(\frac{9}{10}, 0.01\right) = ***.7***$

2) $u\left(\frac{9}{10}, 0.01\right) = ***.3***$

3) $u\left(\frac{9}{10}, 0.01\right) = ***.6***$

4) $u\left(\frac{9}{10}, 0.01\right) = ***.5***$

5) $u\left(\frac{9}{10}, 0.01\right) = ***.4***$

Further Mathematics - Degree in Engineering - 2025/2026
5-Fourier-PDE-Handwritten-training for serial number: 7

Exercise 1

$$\begin{cases} (1+5t+2t^2)\frac{\partial u}{\partial t}(x,t) = 25(5+4t)\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t) = u(\pi,t) = 0 & 0 \le t \\ u(x,0) = 2\sin(4x) + \sin(5x) & 0 \le x \le \pi \\ 0 & \text{True} \end{cases}$$

Compute the value of the solution of this boundary problem at the point x= 1 , t= 0.009 , by separation of variables.

1) u(1 , 0.009) = ***.*******4

2) u(1 , 0.009) = ***.*******3

3) u(1 , 0.009) = ***.*******2

4) u(1 , 0.009) = ***.*******8

5) u(1 , 0.009) = ***.*******5

Exercise 2

$$\begin{cases} \frac{\partial^2 u}{\partial t^2}(x,t) = 25\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t) = u(\pi,t) = 0 & 0 \le t \\ u(x,0) = -9\sin(x) & 0 \le x \le \pi \\ \frac{\partial}{\partial t}u(x,0) = x & 0. \le x \le \pi \\ 0 & \text{True} \end{cases}$$

Compute the position of the string at x= 2 and the moment t= 0.005 by means of a Fourier series of order 1 .

1) u(2 , 0.005) = **6.****

2) u(2 , 0.005) = **2.****

3) u(2 , 0.005) = **0.****

4) u(2 , 0.005) = **4.****

5) u(2 , 0.005) = **8.****

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5-Fourier-PDE-Handwritten-training for serial number: 8

Exercise 1

$$\begin{cases} (-1 + 2\,x)\,(1+2t+t^2)\,\frac{\partial u}{\partial t}(x,t) = (2 + 2\,t)\,\frac{\partial u}{\partial x}(x,t) & 0<x<\pi,\ 0<t \\ u(x,0) = e^{3\,(x^2-x)} - 3\,e^{x-x^2} & 0 \le x \le \pi \\ 0 & \text{True} \end{cases}$$

Compute the value of the solution for this boundary proble at the points x= 1 , t= 0.005 , by means of the technique of separation of variables.

1) u(1 , 0.005) = **2.****

2) u(1 , 0.005) = **5.****

3) u(1 , 0.005) = **4.****

4) u(1 , 0.005) = **0.****

5) u(1 , 0.005) = **1.****

Exercise 2

$$\begin{cases} \frac{\partial^2 u}{\partial t^2}(x,t) = 25\,\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t) = u(\pi,t) = 0 & 0 \le t \\ u(x,0) = -5\,\sin(2\,x) & 0 \le x \le \pi \\ \frac{\partial}{\partial t}u(x,0) = x & 0. \le x \le \pi \\ 0 & \text{True} \end{cases}$$

Compute the position of the string at x= 1 and the moment t= 0.004 by means of a Fourier series of order 1 .

1) u(1 , 0.004) = **9.****

2) u(1 , 0.004) = **3.****

3) u(1 , 0.004) = **7.****

4) u(1 , 0.004) = **1.****

5) u(1 , 0.004) = **0.****

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5-Fourier-PDE-Handwritten-training for serial number: 9

Exercise 1

$$\begin{cases} \frac{\partial^3 u}{\partial t^3}(x,t) = 16\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t) = u(\pi,t) = 0,\ \lim_{t\to\infty} u(x,t) = 0 & 0 \le t \\ u(x,0) = 7\sin(2x) - 5\sin(x) & 0 \le x \le \pi \\ 0 & \text{True} \end{cases}$$

Compute the value of the solution of this boundary problem at the point x= 2 , t= 0.002 , by separation of variables.

1) u(2 , 0.002) = **0.****

2) u(2 , 0.002) = **1.****

3) u(2 , 0.002) = **3.****

4) u(2 , 0.002) = **9.****

5) u(2 , 0.002) = **4.****

Exercise 2

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = 16\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ \frac{\partial u}{\partial x}(0,t) = \frac{\partial u}{\partial x}(\pi,t) = 0 & 0 \le t \\ u(x,0) = x^2 & 0 \le x \le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 2
and the moment t= 0.009 by means of a Fourier series of order 1 .

1) u(2 , 0.009) = **6.****

2) u(2 , 0.009) = **1.****

3) u(2 , 0.009) = **7.****

4) u(2 , 0.009) = **4.****

5) u(2 , 0.009) = **9.****

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5-Fourier-PDE-Handwritten-training for serial number: 10

Exercise 1

$$\begin{cases} \frac{\partial^3 u}{\partial t^3}(x,t) = 16\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t) = u(\pi,t) = 0,\ \lim_{t\to\infty} u(x,t) = 0 & 0 \le t \\ u(x,0) = -9\sin(3x) - 2\sin(7x) & 0 \le x \le \pi \\ 0 & \text{True} \end{cases}$$

Compute the value of the solution of this boundary problem at the point x= 2 , t= 0.001 , by separation of variables.

1) u(2 , 0.001) = ***.9***

2) u(2 , 0.001) = ***.6***

3) u(2 , 0.001) = ***.7***

4) u(2 , 0.001) = ***.2***

5) u(2 , 0.001) = ***.0***

Exercise 2

$$\begin{cases} \frac{\partial^3 u}{\partial t^3}(x,t) = 16\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t) = u(\pi,t) = 0,\ \lim_{t\to\infty} u(x,t) = 0 & 0 \le t \\ u(x,0) = x & 0 \le x \le \pi \\ 0 & \text{True} \end{cases}$$

Compute the value of the solution of this boundary problem at the point x= 2 , t= 0.001 , by separation of variables by means of a Fourier series of order 2.

1) u(2 , 0.001) = **0.****

2) u(2 , 0.001) = **3.****

3) u(2 , 0.001) = **5.****

4) u(2 , 0.001) = **8.****

5) u(2 , 0.001) = **2.****

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5-Fourier-PDE-Handwritten-training for serial number: 11

Exercise 1

$$\begin{cases} (1+3t+2t^2)\frac{\partial u}{\partial t}(x,t) = 25(3+4t)\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<4,\ 0<t \\ u(0,t) = u(4,t) = 0 & 0 \le t \\ u(x,0) = 8\sin\left(\frac{3\pi x}{4}\right) - 4\sin\left(\frac{\pi x}{2}\right) & 0 \le x \le 4 \\ 0 & \text{True} \end{cases}$$

Compute the value of the solution of this boundary problem at the point x= 1 , t= 0.006 , by separation of variables.

1) u(1 , 0.006) = ***.9***

2) u(1 , 0.006) = ***.8***

3) u(1 , 0.006) = ***.6***

4) u(1 , 0.006) = ***.0***

5) u(1 , 0.006) = ***.1***

Exercise 2

$$\begin{cases} \frac{\partial^2 u}{\partial t^2}(x,t) = 25\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<4,\ 0<t \\ u(0,t) = u(4,t) = 0 & 0 \le t \\ u(x,0) = 2\sin\left(\frac{\pi x}{2}\right) & 0 \le x \le 4 \\ \frac{\partial}{\partial t}u(x,0) = x^2 & 0. \le x \le 4 \\ 0 & \text{True} \end{cases}$$

Compute the position of the string at x= 2 and the moment t= 0.003 by means of a Fourier series of order 1 .

1) u(2 , 0.003) = **9.****

2) u(2 , 0.003) = **8.****

3) u(2 , 0.003) = **4.****

4) u(2 , 0.003) = **6.****

5) u(2 , 0.003) = **7.****

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5-Fourier-PDE-Handwritten-training for serial number: 12

Exercise 1

$$\begin{cases} \frac{\partial^2 u}{\partial t^2}(x,t) = 9\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t) = u(\pi,t) = 0 & 0 \le t \\ u(x,0) = \sin(x) & 0 \le x \le \pi \\ \frac{\partial}{\partial t}u(x,0) = -5\sin(6x) & 0. \le x \le \pi \\ 0 & \text{True} \end{cases}$$

Compute the position of the string at x= 1 and the moment t= 0.01 .

1) u(1 , 0.01) = ***.7***

2) u(1 , 0.01) = ***.8***

3) u(1 , 0.01) = ***.6***

4) u(1 , 0.01) = ***.4***

5) u(1 , 0.01) = ***.3***

Exercise 2

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = 9\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ \frac{\partial u}{\partial x}(0,t) = \frac{\partial u}{\partial x}(\pi,t) = 0 & 0 \le t \\ u(x,0) = x & 0 \le x \le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 2
and the moment t= 0.005 by means of a Fourier series of order 2 .

1) u(2 , 0.005) = **8.****

2) u(2 , 0.005) = **5.****

3) u(2 , 0.005) = **9.****

4) u(2 , 0.005) = **1.****

5) u(2 , 0.005) = **2.****

Further Mathematics - Degree in Engineering - 2025/2026
5-Fourier-PDE-Handwritten-training for serial number: 13

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = \frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t) = u(\pi,t) = 0 & 0 \le t \\ u(x,0) = 9\sin(8x) - \sin(7x) & 0 \le x \le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 1 and the moment t= 0.01 .

1) u(1 , 0.01) = **8.****

2) u(1 , 0.01) = **4.****

3) u(1 , 0.01) = **9.****

4) u(1 , 0.01) = **1.****

5) u(1 , 0.01) = **5.****

Exercise 2

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = \frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t) = u(\pi,t) = 0 & 0 \le t \\ u(x,0) = x & 0 \le x \le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 2
and the moment t= 0.001 by means of a Fourier series of order 2 .

1) u(2 , 0.001) = **2.****

2) u(2 , 0.001) = **0.****

3) u(2 , 0.001) = **6.****

4) u(2 , 0.001) = **7.****

5) u(2 , 0.001) = **1.****

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5-Fourier-PDE-Handwritten-training for serial number: 14

Exercise 1

$$\begin{cases} \frac{\partial^3 u}{\partial t^3}(x,t) = 16\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<4,\ 0<t \\ u(0,t) = u(4,t) = 0,\ \text{Lim}_{t\to\infty} u(x,t) = 0 & 0 \le t \\ u(x,0) = 4\sin\left(\frac{5\pi x}{4}\right) - 2\sin\left(\frac{3\pi x}{2}\right) & 0 \le x \le 4 \\ 0 & \text{True} \end{cases}$$

Compute the value of the solution of this boundary problem at the point x= 2 , t= 0.004 , by separation of variables.

1) u(2 , 0.004) = **4.****

2) u(2 , 0.004) = **8.****

3) u(2 , 0.004) = **3.****

4) u(2 , 0.004) = **0.****

5) u(2 , 0.004) = **6.****

Exercise 2

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = 16\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<4,\ 0<t \\ \frac{\partial u}{\partial x}(0,t) = \frac{\partial u}{\partial x}(4,t) = 0 & 0 \le t \\ u(x,0) = x & 0 \le x \le 4 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 2 and the moment t= 0.004 by means of a Fourier series of order 2 .

1) u(2 , 0.004) = **4.****

2) u(2 , 0.004) = **8.****

3) u(2 , 0.004) = **1.****

4) u(2 , 0.004) = **3.****

5) u(2 , 0.004) = **2.****

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5-Fourier-PDE-Handwritten-training for serial number: 15

Exercise 1

$$\begin{cases} \frac{\partial^2 u}{\partial t^2}(x,t) = 9\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t) = u(\pi,t) = 0 & 0 \le t \\ u(x,0) = -9\sin(6x) & 0 \le x \le \pi \\ \frac{\partial}{\partial t}u(x,0) = -8\sin(4x) & 0. \le x \le \pi \\ 0 & \text{True} \end{cases}$$

Compute the position of the string at $x = 1$ and the moment $t = 0.005$.

1) u(1 , 0.005) = **2.****

2) u(1 , 0.005) = **9.****

3) u(1 , 0.005) = **3.****

4) u(1 , 0.005) = **1.****

5) u(1 , 0.005) = **7.****

Exercise 2

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = 9\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ \frac{\partial u}{\partial x}(0,t) = \frac{\partial u}{\partial x}(\pi,t) = 0 & 0 \le t \\ u(x,0) = x & 0 \le x \le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x = 2$
and the moment $t = 0.001$ by means of a Fourier series of order 2 .

1) u(2 , 0.001) = **4.****

2) u(2 , 0.001) = **2.****

3) u(2 , 0.001) = **8.****

4) u(2 , 0.001) = **9.****

5) u(2 , 0.001) = **6.****

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5-Fourier-PDE-Handwritten-training for serial number: 16

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = 4\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<2,\ 0<t \\ \frac{\partial u}{\partial x}(0,t) = \frac{\partial u}{\partial x}(2,t) = 0 & 0 \le t \\ u(x,0) = 7\cos\left(\frac{5\pi x}{2}\right) + 3\cos\left(\frac{7\pi x}{2}\right) & 0 \le x \le 2 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x = \frac{9}{5}$ and the moment $t = 0.001$.

1) $u\left(\frac{9}{5}, 0.001\right) = **3.****$

2) $u\left(\frac{9}{5}, 0.001\right) = **9.****$

3) $u\left(\frac{9}{5}, 0.001\right) = **1.****$

4) $u\left(\frac{9}{5}, 0.001\right) = **7.****$

5) $u\left(\frac{9}{5}, 0.001\right) = **4.****$

Exercise 2

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = 4\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<2,\ 0<t \\ u(0,t) = u(2,t) = 0 & 0 \le t \\ u(x,0) = x & 0 \le x \le 2 \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x = \frac{3}{2}$

and the moment $t = 0.008$ by means of a Fourier series of order 2 .

1) $u\left(\frac{3}{2}, 0.008\right) = **8.****$

2) $u\left(\frac{3}{2}, 0.008\right) = **2.****$

3) $u\left(\frac{3}{2}, 0.008\right) = **6.****$

4) $u\left(\frac{3}{2}, 0.008\right) = **4.****$

5) $u\left(\frac{3}{2}, 0.008\right) = **1.****$

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5-Fourier-PDE-Handwritten-training for serial number: 17

Exercise 1

$$\begin{cases} \frac{\partial^3 u}{\partial t^3}(x,t) = 16\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t) = u(\pi,t) = 0,\ \lim_{t\to\infty} u(x,t) = 0 & 0 \le t \\ u(x,0) = 7\sin(3x) + 3\sin(8x) & 0 \le x \le \pi \\ 0 & \text{True} \end{cases}$$

Compute the value of the solution of this boundary problem at the point x= 1 , t= 0.01 , by separation of variables.

1) u(1 , 0.01) = **9.****

2) u(1 , 0.01) = **3.****

3) u(1 , 0.01) = **1.****

4) u(1 , 0.01) = **4.****

5) u(1 , 0.01) = **7.****

Exercise 2

$$\begin{cases} \frac{\partial^3 u}{\partial t^3}(x,t) = 16\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t) = u(\pi,t) = 0,\ \lim_{t\to\infty} u(x,t) = 0 & 0 \le t \\ u(x,0) = x & 0 \le x \le \pi \\ 0 & \text{True} \end{cases}$$

Compute the value of the solution of this boundary problem at the point x= 1 , t= 0.006 , by separation of variables by means of a Fourier series of order 2.

1) u(1 , 0.006) = ***.9***

2) u(1 , 0.006) = ***.3***

3) u(1 , 0.006) = ***.1***

4) u(1 , 0.006) = ***.6***

5) u(1 , 0.006) = ***.8***

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5-Fourier-PDE-Handwritten-training for serial number: 18

Exercise 1

$$\begin{cases} (1+9t+t^2)\frac{\partial u}{\partial t}(x,t) = 25(9+2t)\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t) = u(\pi,t) = 0 & 0 \le t \\ u(x,0) = -5\sin(6x) - 7\sin(7x) & 0 \le x \le \pi \\ 0 & \text{True} \end{cases}$$

Compute the value of the solution of this boundary problem at the point x= 1 , t= 0.002 , by separation of variables.

1) u(1 , 0.002) = ***.******1

2) u(1 , 0.002) = ***.******7

3) u(1 , 0.002) = ***.******3

4) u(1 , 0.002) = ***.******8

5) u(1 , 0.002) = ***.******2

Exercise 2

$$\begin{cases} \frac{\partial^2 u}{\partial t^2}(x,t) = 25\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t) = u(\pi,t) = 0 & 0 \le t \\ u(x,0) = 2\sin(2x) & 0 \le x \le \pi \\ \frac{\partial}{\partial t}u(x,0) = x^2 & 0. \le x \le \pi \\ 0 & \text{True} \end{cases}$$

Compute the position of the string at x= 1
and the moment t= 0.01 by means of a Fourier series of order 1 .

1) u(1 , 0.01) = **2.****

2) u(1 , 0.01) = **3.****

3) u(1 , 0.01) = **0.****

4) u(1 , 0.01) = **5.****

5) u(1 , 0.01) = **7.****

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5-Fourier-PDE-Handwritten-training for serial number: 19

Exercise 1

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = 4\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ \frac{\partial u}{\partial x}(0,t) = \frac{\partial u}{\partial x}(\pi,t) = 0 & 0 \le t \\ u(x,0) = 3\cos(4x) - 9\cos(5x) & 0 \le x \le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point $x = 1$ and the moment $t = 0.002$.

1) $u(1, 0.002) = **0.****$

2) $u(1, 0.002) = **5.****$

3) $u(1, 0.002) = **3.****$

4) $u(1, 0.002) = **8.****$

5) $u(1, 0.002) = **4.****$

Exercise 2

$$\begin{cases} \frac{\partial^3 u}{\partial t^3}(x,t) = 4\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t) = u(\pi,t) = 0,\ \lim_{t\to\infty} u(x,t) = 0 & 0 \le t \\ u(x,0) = x^2 & 0 \le x \le \pi \\ 0 & \text{True} \end{cases}$$

Compute the value of the solution of this boundary problem at the point $x = 1$, $t = 0.002$, by separation of variables by means of a Fourier series of order 1.

1) $u(1, 0.002) = **2.****$

2) $u(1, 0.002) = **9.****$

3) $u(1, 0.002) = **0.****$

4) $u(1, 0.002) = **3.****$

5) $u(1, 0.002) = **4.****$

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5-Fourier-PDE-Handwritten-training for serial number: 20

Exercise 1

$$\begin{cases} \frac{\partial^2 u}{\partial t^2}(x,t) = 9\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ u(0,t) = u(\pi,t) = 0 & 0 \le t \\ u(x,0) = -5\sin(5x) & 0 \le x \le \pi \\ \frac{\partial}{\partial t}u(x,0) = \sin(x) & 0. \le x \le \pi \\ 0 & \text{True} \end{cases}$$

Compute the position of the string at x= 2 and the moment t= 0.008 .

1) u(2 , 0.008) = **4.****

2) u(2 , 0.008) = **6.****

3) u(2 , 0.008) = **3.****

4) u(2 , 0.008) = **2.****

5) u(2 , 0.008) = **9.****

Exercise 2

$$\begin{cases} \frac{\partial u}{\partial t}(x,t) = 9\frac{\partial^2 u}{\partial x^2}(x,t) & 0<x<\pi,\ 0<t \\ \frac{\partial u}{\partial x}(0,t) = \frac{\partial u}{\partial x}(\pi,t) = 0 & 0 \le t \\ u(x,0) = x^2 & 0 \le x \le \pi \\ 0 & \text{True} \end{cases}$$

Compute the temperature of the bar at the point x= 1
and the moment t= 0.006 by means of a Fourier series of order 1 .

1) u(1 , 0.006) = **7.****

2) u(1 , 0.006) = **2.****

3) u(1 , 0.006) = **8.****

4) u(1 , 0.006) = **1.****

5) u(1 , 0.006) = **6.****