

MATH4564 - Homework6-Quiz 5 - Fall 03 - Konaté

Notice: Show your work. A right answer with a bad reasoning will be considered as wrong. Use a computer to do your work.

Problem 1

Consider function $f(x) = x^2$ for $0 < x < 2$.

1.1 Use the trapezoidal rule to represent on the same graph, over the interval $[0, 12]$ $f_{+,p}$ and the cosine series for f . with 6 terms.

1.2 Use the trapezoidal rule to represent on the same graph, over the interval $[0, 12]$ $f_{-,p}$ and the sine series for f . with 6 terms.

1.3 Evaluate the error you commit in calculating each a_m and each b_m by the trapezoidal rule.

Problem 2• Determine the type of the equation (elliptic, parabolic or hyperbolic; Dirichlet homogeneous or non homogeneous) and solve the problem:

$$\begin{cases} 3\frac{\partial^2 u}{\partial x^2} - \frac{\partial^2 u}{\partial t^2} = 0; & 0 < x < 2; t > 0 \\ u(0, t) = 0; & u(2, t) = 0; & t > 0 \\ u(x, 0) = -\sin(\pi x) + \frac{\pi}{2}\sin(2\pi x) + \pi\sin(\frac{5\pi x}{2}); & 0 < x < 2 \\ \frac{\partial u}{\partial t}(x, 0) = 2\sin(\frac{3\pi x}{2}) + \pi\sin(\frac{5\pi x}{2}); & 0 < x < 2 \end{cases} \quad (2).$$

problem 3• Determine the type of the equation (elliptic, parabolic or hyperbolic) and the type of the boundary condition (Dirichlet, Newman, homogeneous or non homogeneous etc...) solve the problem and graph its solution over the interval $0 \leq x < 15$; $0 \leq t < 10$ when the Fourier series is calculated with 6 terms:

$$\begin{cases} \pi^2\frac{\partial^2 u}{\partial x^2} - \frac{\partial u}{\partial t} = 0; & 0 < x < 3; t > 0 \\ u_x(0, t) = 0; & u_x(3, t) = 0; & t > 0 \\ u(x, 0) = x; & 0 < x < 3 \end{cases} \quad (1).$$
