

MATH4564 - Homework No5 and -Quiz No3 - Fall 03 - Konaté

Notice: Show your work. A right answer with a bad reasoning will be considered as wrong. Use a computer and any dialect to perform your graphing.

Problem A• (50 points)

Consider the Initial value problem (IVP):

$$\begin{cases} y'' + 2y' + 2y = g(t) \\ y(0) = 0 \\ y'(0) = 1 \end{cases} \quad \text{where } g(t) = \begin{cases} 0 & \text{for } 0 < t < \pi \\ 1 & \text{for } \pi < t < 2\pi \\ 0 & \text{for } 2\pi < t < +\infty \end{cases}$$

A.1• Plot the graph of $g(t)$ over the interval $I =]0, 15[$;

A.2• Solve the equation by using the Laplace Transform.

A.3• Plot over the same interval I the graphs in the same picture of the solutions obtained by: the Laplace Transform, the Euler Method, the Finite Difference Method and the RK4 method.

Problem B• (50 points)

Consider the Initial value problem (IVP):

$$\begin{cases} y'' - ty' + \cos(t)y = \sin(t) + t \\ y(0) = 1 \\ y'(0) = 1 \end{cases}$$

B.1• Plot the graph of $h(t) = \sin(t) + t$ over the interval $I =]0, 15[$;

B.2• Plot over the same interval I the graphs in the same picture of the solutions obtained by: the Euler Method, the Modified Euler method, the Finite Difference Method and the RK4 method.
