Menoufiya University	Dep.: Basic Science and Eng.
Faculty of Engineering	Introduction to O.D.E.
Code:BES506	11\1\2014
Time: 3 hours	Marks:100

Answer all the following questions:

1) Find the general solution of the O.D.E.

$$y^{\backslash\backslash\backslash} + y^{\backslash} = 0$$

Also find the solution that satisfies the initial conditions:

$$y(0) = 0, \quad y^{\backslash}(0) = 1, \quad y^{\backslash\backslash}(0) = 2$$

2) Find the total solution of the nonhomogeneous D.E.:

$$y^{\backslash\backslash\backslash} - 3y^{\backslash\backslash} + 3y^{\backslash} - y = 4e^{t}$$

3) Find the series solution of the differential equation:

$$y^{\backslash\backslash} + y = 0 \qquad\qquad -\infty < x < \infty$$

4) Solve the system of first order linear D.E.:

$$\frac{dI}{dt} = -I - v$$

$$\frac{dv}{dt} = 2I - v$$

5) Using Rung-Kutta method to calculate the approximate value of the initial value problem:

$$y^{\backslash} = 1 - t + 4y \qquad\qquad y(0) = 1$$

6) For the system of homogeneous linear D.E. with constant coefficients:

$$x^{\backslash} = \begin{bmatrix} 1 & 1 \\ 4 & 1 \end{bmatrix} x$$

find the general solution.

With my best wishes   **Dr. Elsayed Zaky**