ENGINEERING MATHEMATICS FINAL JANUARY 2012

Attention: Solve only FOUR questions.

1. Find the solution of the initial value problem given below

$$\frac{\partial^2 y}{\partial x^2} = 2(\frac{\partial y}{\partial x})y$$

$$for \;\; x = 0 \quad y = 1, \;\; \frac{\partial y}{\partial x} = 5$$

2. Find the most general solution of the differential equation given below

$$x^2 \frac{\partial^2 y}{\partial x^2} - 6y = 1 + ln(x)$$

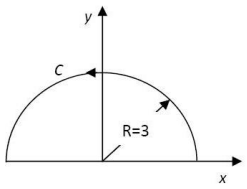
3. Find the most general solution of the differential equation given below

$$L(\mathbf{D})y = 0, \; where \;\; L(x) = (x-1)^3 + 27, \;\; \mathbf{D} = \frac{d}{dt}$$

4. Find the matrix exponential for the matrix $\mathbf{A}$ given below.

$$\mathbf{A} = \begin{bmatrix} 2 & 1 & 0 & 0 \\ -9 & 2 & 0 & 0 \\ 0 & 0 & 2 & 1 \\ 0 & 0 & -9 & 2 \end{bmatrix}$$

5. Calculate the contour integral over contour C given in figure



I=$\oint_C \frac{dz}{(z^2+1)^2}$