110-1 ENGINEERING MATHEMATICS HW1

Part I: Differential and Integral.

1.(10%)$f(x) = (x-1)^2(x-4)(x+2)^{-\frac{1}{2}}, slove\, \frac{df(x)}{dx}$

2.(10%)$\int (ln\, x)^3 dx$ =?

3.(10%)$\int (x^3 + 3x + 3)e^{2x} dx$ =?

Part II: State the order of the given equation and determine the equation is linear or nonlinear.

4.(10%)$(1-x)y'' - 4xy + 5y = cos(x)$

5.(10%)$\frac{d^2y}{dx^2} = \sqrt{1 + (\frac{dy}{dx})^2}$

Part III: Determine if there is a unique solution

6.(10%)$y' = e^{xy^2}, y(0) = 1$

7.(10%)$y' = \sqrt{y}, y(0) = 0$

8.(10%)$y' = \sqrt{1-y^2}, y(0) = 1$

Part IV: Determine whether the given differential equation is exact. If is exact, solve it.

9.(10%)$(sin\, y - y\, sin\, x)dx + (cos\, x + x\, cos\, y - y)dy = 0$

10.(10%)$(1 + ln\, x + \frac{y}{x})dx = (1 - ln\, x)dy$