

ASSIGNMENT 1

YAKUBU HEERMAT

17/ENG02/080

COMPUTER ENGINEERING

ENG 282

- 1 A differential equation is a relationship between dependent & independent variables & a derivative of the dependent variable with respect to the independent variable.

a i $x \frac{dy}{dx} = 2x - y$

ii $y = x \frac{dy}{dx} - \frac{x^2}{2} \frac{d^2y}{dx^2}$

b i Second order Equation

- ii It is a second order equation because it has two arbitrary constant.

iii $y = Ae^{-4x} + Be^{-6x}$

$\frac{dy}{dx} = -4Ae^{-4x} - 6Be^{-6x} \dots \textcircled{2}$

$$\frac{dy}{dx} = 16Ae^{-4x} + 80Be^{-6x} \quad \text{--- (5)}$$

$$4A = \frac{y - Ae^{-6x}}{e^{-4x}} \quad \text{--- (4)}$$

Substituting 4 into 3

$$\frac{dy}{dx} = -4 \left(\frac{y - Ae^{-6x}}{e^{-4x}} \right) e^{-4x} - 60e^{-6x}$$

$$= -4y + 40e^{-6x} - 60e^{-6x}$$

$$= -4y - 20e^{-6x} \quad \text{--- (6)}$$

$$\frac{dy}{dx} = -4y - 20e^{-6x}$$

$$\frac{dy}{dx} + 4y = -20e^{-6x}$$

$$= -\frac{1}{20}e^{-6x} \left[\frac{dy}{dx} + 4y \right] = B \quad \text{--- (6)}$$

Substituting eqn 6 into 4

$$A = \frac{y - Ae^{-6x}}{e^{-4x}}$$

$$A = y - \left[\frac{1}{20}e^{-6x} \left[\frac{dy}{dx} + 4y \right] \right] e^{-6x}$$

