

THEOPHIL MAAH MEMBERS

7/ENG03/2021

CIVIL ENGINEERING

ENR 232

Assignment One

1) A differential equation is the relationship between an independent variable x , and a dependent variable y and one or more derivatives of y with respect to x

$$\text{E.g. } x^2 \frac{dy}{dx} = y \cdot \cos x = 0$$

$$\cos x \cdot x \frac{dy}{dx} + y = 1$$

$$2) y = Ae^{-4x} + Be^{-6x}$$

$$\frac{dy}{dx} = -4Ae^{-4x} + (-6Be^{-6x})$$

$$= -4Ae^{-4x} - 6Be^{-6x}$$

$$\frac{d^2y}{dx^2} = 16Ae^{-4x} + 36Be^{-6x}$$

From equation 2

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

$$4Ae^{-4x} = \left[\frac{-dy}{dx} - 6Be^{-6x} \right]^{1/4}$$

$$A = \left[\frac{-dy}{dx} - 6Be^{-6x} \right]^{1/4} e^{-4x} \dots \textcircled{4}$$

part eq ⑩ into ⑧

$$\frac{d^2 y}{dx^2} = 16x \left[\frac{-dy}{dx} - 6BC - 6x \right] / 4e^{-4x} \times e^{4x} + 36BCe^{4x}$$

$$\frac{d^2 y}{dx^2} = 4 \left[\frac{-dy}{dx} - 6BC - 6x \right] + 36BCe^{-6x}$$

$$\frac{d^2 y}{dx^2} = \frac{-4dy}{dx} + 12BCe^{-6x} + 36BCe^{-6x}$$

$$\frac{d^2 y}{dx^2} = \frac{-4dy}{dx}$$

$$B = \left[\frac{d^2 y}{dx^2} + \frac{4dy}{dx} \right] / 12e^{-6x} \dots \text{⑤}$$

part eq ⑤ into ⑩

$$A = \left[\frac{-dy}{dx} - 6 \left(\frac{d^2 y}{dx^2} + \frac{4dy}{dx} \right) \right] / 12e^{-6x} \times e^{-4x} / 4e^{-4x}$$

$$A = \left[\frac{dy}{dx} - \frac{1}{2} \frac{d^2 y}{dx^2} - 2 \frac{dy}{dx} \right] / 4e^{-4x}$$

$$A = \left[-\frac{3}{4} \frac{dy}{dx} - \frac{1}{2} \frac{d^2 y}{dx^2} \right] / 4e^{-4x} \dots \text{⑥}$$

part eq ⑤ and eq ⑥ into eq ⑩

$$\int \left[-\frac{3}{4} \frac{dy}{dx} - \frac{1}{2} \frac{d^2 y}{dx^2} \right] / 4e^{-4x} \times e^{-4x} + e^{-4x} \left[\frac{d^2 y}{dx^2} + \frac{4dy}{dx} \right] / 12e^{-4x}$$

$$B = -\frac{3}{4} \frac{dy}{dx} - \frac{1}{2} \frac{d^2 y}{dx^2} + \frac{1}{2} \frac{d^2 y}{dx^2} + \frac{1}{3} \frac{dy}{dx}$$

$$y = \frac{-5}{12} \frac{dy}{dx} - \frac{1}{24} \frac{d^2 y}{dx^2}$$

$$y = \left[\frac{-5 dy}{dx} - \frac{1}{2} \frac{d^2 y}{dx^2} \right] \frac{1}{12}$$