

Name : Olayide Anjo Alex.

EMG MATH.

Matric No : 17/ENG06/064

Dep: Mechanical

①  $Y = e^{x^2+x}$

$$Y' = (2x+1)e^{(x^2+x)}$$

$$Y'' = 2e^{x^2+x} + (2x+1)(2x+1)e^{x^2+x}$$

$$\begin{aligned} &= 2Y + (2x+1)Y' \\ &= (2x+1)e^{x^2+x} \cdot (2x+1) + 2(e^{x^2+x}) \\ &= (2x+1)^2 e^{x^2+x} + 2e^{x^2+x} \end{aligned}$$

$$Y'' = 2Y + (2x+1)Y'$$

from  $Y'' = 2Y + (2x+1)Y'$

$$A = Y'' \quad A^n = Y^{n+2}$$

$$B = 2Y \quad B^n = 2Y^n$$

$$C = (2x+1)Y' \quad C^n = (2x+1)Y^{n+1} + 2nY^n$$

$$\begin{aligned} Y^{n+2} &= (2x+1)Y^{n+1} + 2nY^n + 2Y^n \\ Y^{n+2} &= (2x+1)Y^{n+1} + 2Y^n(n+1) \end{aligned}$$

②  $Y = x^3 e^{4x}$

$$Y^n = u^n v + n u^{n-1} v' + \frac{n(n-1)}{2!} u^{n-2} v^2 + \frac{n(n-1)(n-2)}{3!} u^{n-3} v^3 + \dots$$

$$Y^5 = u^5 v + 5u^4 v' + \frac{5(5-1)}{2 \times 1} u^{5-2} v^2 + \frac{5(5-1)(5-2)}{3 \times 2 \times 1} u^{5-3} v^3 + \dots$$

$$Y^5 = u^5 v + 5u^4 v' + 10u^3 v^2 + 10u^2 v^3 + 5u^1 v^4 + 4v^5$$

$$u = e^{4x}$$

$$v = x^3$$

$$Y^5 = 4^5 e^{4x} + (5)(4^4) e^{4x} \cdot (3x^2) + 10(4^3 e^{4x})(6x) + 10(4^2 e^{4x})(6) + 5(4 e^{4x})(6) + 4e^{4x}$$

$$Y^5 = 1024x e^{4x} + 3840x^2 e^{4x} + 3840x e^{4x} + 960 e^{4x}$$

$$= 64e^{4x} (16x + 240x^2 + 240x + 15)$$

$$\textcircled{3} \quad x^2 \frac{d^2 y}{dx^2} + x \frac{dy}{dx} + y = 0$$

$$x^2 y'' + x y' + y = 0$$

$$A = x^2 y''$$

$$A^n = x^2 y^{n+2} + 2x(n)y^{n+1} + \frac{2n(n-1)}{2!} y^n$$

$$B = x y'$$

$$B^n = x y^{n+1} + n y^n$$

$$C = y$$

$$C^n = y^n$$

$$A^n + B^n + C^n = 0$$

$$x^2 y^{n+2} + 2x(n)y^{n+1} + n(n-1)y^n + x y^{n+1} + n y^n + y^n = 0$$

$$x^2 y^{n+2} + 2x(n+1)y^{n+1} + (n^2 - n + n + 1)y^n = 0$$

$$x^2 y^{n+2} + 2x(n+1)y^{n+1} + (n^2 + 1)y^n = 0$$

