

Faktor Zonari-Tebe.

11/Eng02/012

Petroleum Engineering.

$$y = e^{2x}$$

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

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

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

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

$$(2n+1)^2 e^{2x+n} + 2e^{2x+n}$$

$$\text{but } y'' = 2e^{2x+n} + (2n+1)^2$$

$$y'' = y'(2n+1) + 2y$$

from the equation

Part A

$$A = y''', A' = y''', A'' = y^{2+n}$$

Part B

$$B = y'(2n+1)$$

$$u = y', u'' = y^{2+n}$$

$$v = 2n+1, v'' = 2$$

$$B = y'(2n+1) + n(y'')(2) + 0$$

$$B'' = (2n+1)y^{2+n} + 2ny''$$

Part C

$$C = 2y$$

$$C'' = 2y''$$

$$A'' + B'' + C''$$

$$y^{2+n} = (2n+1)y^{2+n} + 2ny'' + 2y''$$

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

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

2-c) $y = x^3 e^{4x}$, y^5
 let $u = e^{4x}$, $v = x^3$ + $u' = 4e^{4x}$, $u'' = 16e^{4x}$, $u''' = 64e^{4x}$
 let $v' = 3x^2$, $v'' = 6x$, $v''' = 6$, $v^{(4)} = 0$

Using Leibniz theorem.

$$y^n = \frac{4^n e^{4nx}}{(n-3)!} x^3 + n \cdot 4^{n-1} e^{4nx} \cdot 3x^2 + \frac{n(n-1)}{2!} 4^{n-2} e^{4nx} \cdot 6x + \frac{n(n-1)(n-2)}{3!} 4^{n-3} e^{4nx} \cdot 6 + 0$$

$$y^5 = 4^5 e^{4nx} \cdot x^3 + 3 \cdot 4^4 e^{4nx} \cdot 3x^2 + 3(3) \cdot 4^3 e^{4nx} \cdot 6x + (3)(2)(1) \cdot 4^2 e^{4nx} \cdot 6 + 0$$

$$y^5 = 1024 e^{4nx} \cdot x^3 + 3840 e^{4nx} \cdot x^2 + 3840 e^{4nx} \cdot x + 960 e^{4nx}$$

$$y^5 = 64 e^{4nx} (16x^3 + 60x^2 + 60x + 15)$$

a) $x^2 \frac{d^2 y}{dx^2} + x \frac{dy}{dx} + y = 0$, shows that $n^2 y(n+2) + (2n+1)x + y(n+2) + (n^2+1)y = 0$

For part A

$$A = x^2 y^n$$

$$u = y^n, u' = n y^{n-1} y'$$

$$v = x^2, v' = 2x, v'' = 2, v''' = 0$$

$$A' = (y^n) 2x + n(y^{n-1}) 2x + \frac{n(n-1)}{2} (y^{n-2}) 2 + 0$$

$$A'' = 2x^2 y^{n-2} 2x + \frac{n(n-1)}{2} (y^{n-2}) 2 + 0$$

$$A''' = 2x^2 y^{n-2} + 2nxy^{n-1} + n(n-1)y^n$$

For part B

$$B = xy^n$$

$$u = y^n, u' = n y^{n-1} y'$$

$$v = x, v' = 1, v'' = 0$$

$$B' = (y^n) \cdot 1 + n(y^{n-1}) \cdot 1 + 0$$

$$2xy^{n-1} + ny^n$$

For part c

$$C = y$$

$$C^n = y^n$$

$$2A^n + B^n + C^n = 0$$

$$2 \cdot n^2 y^{n+2} + 2nny^{n+1} + (n^2 - n)y^n$$

$$2n^2 y^{n+2} + ny^{n+1} (2n+1) + y^n (n^2 - n + n + 1)$$

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