

UDOUSORO, JAMAL  
15/ENG04/058  
ELECT ENGR.

1.  $y = e^{x^2+x}$

$$dy/dx = (2x+1)e^{x^2+x}$$

$$d^2y/dx^2 = 2e^{x^2+x} + (2x+1)(2x+1)e^{x^2+x}$$
$$= e^{x^2+x} ((2x+1)(2x+1) + 2)$$

$$y'(2x+1) + 2y$$

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

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

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

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

$w_1$

$w_2$

$w_3$

$$w_1 = v = y^2$$

$$v^n = y^{(n+2)}$$

$w_2$

$$u = y'$$

$$v = 2x+1$$

$$u^n = y^{(n+1)}$$

$$v' = 2$$

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

$$v'' = 0$$

$w_3$

$$u = y$$

$$v = 2$$

$$u^n = y^n$$

$$v' = 0$$

$$w_1 = w_2 + w_3$$

$$y^{n+2} = y^{(n+1)}(2x+1) + ny^n \cdot 2 + y^n \cdot 2$$

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

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

$$2) y = x^3 e^{4x}$$

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

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

$$u^{n-1} = 4^{n-1} e^{4x}$$

$$u^{n-2} = 4^{n-2} e^{4x}$$

$$u^{n-3} = 4^{n-3} e^{4x}$$

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

$$6x + \frac{n(n-1)(n-3)}{3!} 4^{n-3} e^{4x} \cdot 6$$

$$n = 5$$

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

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

$$\text{now put } x^2 y^{(2)} + (2n+1)xy^{(1)} + (n^2+1)y^n = 0$$

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

$$w_1 \quad w_2 \quad w_3$$

$w_1$

$$u = y^{(2)}$$

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

$$u^{(n-1)} = y^{(n+1)}$$

$$u^{(n-2)} = y^{(n)}$$

$$v = x^2$$

$$v' = 2x$$

$$v'' = 2$$

$$v''' = 0$$

$w_2$

$$u = y^{(1)}$$

$$u^n = y^{n+1}$$

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

$$v = x$$

$$v' = 1$$

$$v'' = 0$$

$w_3$

$$u = y$$

$$u^n = y^n$$

$$w_1 + w_2 + w_3$$



MORE

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

$$ny^n + y^n = 0$$

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

$$= x^2 y^{n+1} + 2xny^{n+1} + xy^{n+1} + n(n-1)y^n + ny^n + y^n$$

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

$$= x^2 y^{n+1} + xy^{n+1}(2n+1) + y^n[n^2 - n + n + 1]$$

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



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