

1) Find dy/dx if $y = (2 \cos 3x) / x^3$.

$$\frac{d}{dx} \left[\frac{2 \cos(3x)}{x^3} \right]$$

$$= 2 \cdot \frac{d}{dx} \left[\frac{\cos(3x)}{x^3} \right]$$

$$= 2 \cdot \frac{d}{dx} [\cos(3x)] \cdot x^3 - \cos(3x) \cdot \frac{d}{dx} [x^3]$$

$$= 2 \cdot (-\sin(3x)) \cdot \frac{d}{dx} [3x] \cdot x^3 - 3x^2 \cos(3x)$$

$$= 2 \cdot (-3 \cdot \frac{d}{dx} [x] \cdot x^3 \sin(3x) - 3x^2 \cos(3x))$$

$$= 2 \cdot (-3 \cdot 1 \cdot x^3 \sin(3x) - 3x^2 \cos(3x))$$

$$= 2 \cdot (-3x^3 \sin(3x) - 3x^2 \cos(3x))$$

$$= -\frac{6 \sin(3x)}{x^3} - \frac{6 \cos(3x)}{x^2}$$

② $y = x e^{2x}$

$$\frac{d^2 y}{dx^2} - 4 \frac{dy}{dx} + 4y = 0$$

$$(4x+4)e^{2x} - 4(2x+1)e^{2x} + 4x e^{2x} = 0$$

$$(4x+4)e^{2x} - (8x+4)e^{2x} + 4x e^{2x} = 0$$

Divide all through by e^{2x} .

$$4x + 4 - 8x - 4 + 4x = 0.$$

Q.E.D

③ Энота ОКОН Энотс 19/07/2018 Electrical Electronics Engineering.

④ $\frac{d}{dx} [e^{2x} \sin(2x)]$.

$$= \frac{d}{dx} [e^{2x}] \cdot \sin(2x) + e^{2x} \cdot \frac{d}{dx} [\sin(2x)].$$

$$= e^{2x} \cdot \frac{d}{dx} [2x] \cdot \sin(2x) + e^{2x} \cos(2x) \cdot \frac{d}{dx} [2x].$$

$$= e^{2x} \cdot 2 \cdot \frac{d}{dx} [x] \cdot \sin(2x) + e^{2x} \cos(2x) \cdot 2 \cdot \frac{d}{dx} [x].$$

$$= 2e^{2x} \cdot 1 \sin(2x) + 2e^{2x} \cos(2x) \cdot 1$$

$$= 2e^{2x} \sin(2x) + 2e^{2x} \cos(2x).$$

$$2e^{2x} (\sin(2x) + \cos(2x)).$$