

Open Mind Guruji

Derivatives: Lecture 03

Q.1 Find $\frac{dy}{dx}$ if $y = \cos(5x)$

→ given

$$y = \cos(5x) \quad \text{--- (1)}$$

differentiate w.r.t. x

$$\frac{d}{dx} y = \frac{d}{dx} \cos(5x)$$

$$\frac{d}{dx} \cos x = -\sin x$$

$$= -\sin(5x) \cdot \frac{d}{dx}(5x)$$

$$\frac{dy}{dx} = -\sin(5x) \cdot 5 \frac{d}{dx} x$$

$$= -\sin(5x) \cdot 5 \times 1$$

$$\frac{dy}{dx} = -5 \sin(5x)$$



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Q.4 Find $\frac{dy}{dx}$ if $y = \log(x^2 + 2x)$

→ given

$$y = \log(x^2 + 2x) \quad \text{--- (1)}$$

differentiate w.r.t. x

$$\frac{d}{dx} y = \frac{d}{dx} \log(x^2 + 2x)$$

$$\frac{d}{dx} \log x = \frac{1}{x}$$

$$= \frac{1}{x^2 + 2x} \cdot \frac{d}{dx}(x^2 + 2x)$$

$$\frac{dy}{dx} = \frac{1}{x^2 + 2x} \left[\frac{d}{dx} x^2 + \frac{d}{dx} 2x \right]$$

$$= \frac{1}{x^2 + 2x} [2x + 2 \times 1]$$

$$\frac{dy}{dx} = \frac{1}{x^2 + 2x} [2x + 2]$$

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Q.7. If $y = \sin(e^{3x})$ find $\frac{dy}{dx}$

→ given

$$y = \sin(e^{3x})$$

diff w.r.t. x

$$\frac{d}{dx} y = \frac{d}{dx} \sin(e^{3x})$$

$$\frac{d}{dx} \sin(x) = \cos x$$

$$= \cos(e^{3x}) \cdot \frac{d}{dx} e^{3x}$$

$$\frac{d}{dx} e^x = e^x$$

$$\frac{dy}{dx} = \cos(e^{3x}) \cdot e^{3x} \cdot \frac{d}{dx} (3x)$$

$$= \cos(e^{3x}) \times e^{3x} \times 3 \times 1$$

$$\frac{dy}{dx} = 3 e^{3x} \cdot \cos(e^{3x})$$

