

## H.w 2

سوال 2

$$1) y = 2x^3 - 4x^2 + 6x - 5$$

$$\frac{dy}{dx} = 6x^2 - 8x + 6$$

$$\frac{d^2y}{dx^2} = 12x - 8$$

$$\frac{d^3y}{dx^3} = 12$$

$$2) \quad X \cos(2X+3) = Y \sin X$$

Sol:—

$$- X \sin(2X+3) \cdot 2 + \cos(2X+3) \cdot 1 =$$

$$\frac{dy}{dx} \sin X + y \cos X$$

$$- 2X \sin(2X+3) + \cos(2X+3) = \frac{dy}{dx} \sin X + y \cos X$$

$$- 2X \sin(2X+3) + \cos(2X+3) - y \cos X = \frac{dy}{dx} \sin X$$

$$\frac{dy}{dx} = \frac{-2X \sin(2X+3) + \cos(2X+3) - y \cos X}{\sin X}$$

$$3) \quad x^2 + y^2 - 25 = 0$$

Sol:—

$$2x + 2y \frac{dy}{dx} - 0 = 0$$

$$2y \frac{dy}{dx} = -2x \Rightarrow \frac{dy}{dx} = \frac{-2x}{2y}$$

$$\frac{dy}{dx} = \frac{-x}{y}$$



4) Find  $\frac{dy}{dx}$ ,  $y = 6u - 9$ ,  $u = \frac{x^4}{2} \Rightarrow \frac{1}{2}x^4$

$$\frac{dy}{du} = 6, \quad \frac{du}{dx} = \frac{4}{2}x^3 \Rightarrow 2x^3$$

$$\frac{dy}{dx} = \frac{dy}{du} \cdot \frac{du}{dx}$$

$$6 \cdot 2x^3 = 12x^3$$

5)  $\sin^2\left(x^2 + \frac{1}{x^2}\right)$

$$\frac{dy}{dx} = 2 \sin\left(x^2 + \frac{1}{x^2}\right) \cdot \cos\left(x^2 + \frac{1}{x^2}\right) \cdot$$

$$\left(2x + \frac{x^2 \cdot 0 - 1 \cdot 2x}{x^4}\right)$$

$$\frac{dy}{dx} = 2 \sin\left(x^2 + \frac{1}{x^2}\right) \cdot \cos\left(x^2 + \frac{1}{x^2}\right) \cdot \left(2x + \frac{-2x}{x^4}\right)$$

$$6) y = \tan^{-3}(3x^2 + \sec^2 2x)$$

$$\frac{dy}{dx} = -3 \tan^{-4}(3x^2 + \sec^2 2x) \cdot \sec^2(3x^2 + \sec^2 2x) \cdot$$

$$(6x + 2 \sec 2x \cdot \sec 2x \tan 2x \cdot 2)$$

