

Diffrentiation = अवकलन

**06. Product rule**

$$\frac{d}{dx}(uv) = u \frac{dv}{dx} + v \frac{du}{dx}$$

-----

$$y = (x + 1).(x - 1)$$

$$\frac{d}{dx}(x + 1).(x - 1)$$

$$= (x + 1) \frac{d}{dx}(x - 1) + (x - 1) \frac{d}{dx}(x + 1)$$

$$= (x + 1) \left[ \frac{d}{dx}(x) - \frac{d}{dx}(1) \right] + (x - 1) \left[ \frac{d}{dx}(x) + \frac{d}{dx}(1) \right]$$

$$= (x + 1)[1 - 0] + (x - 1)[1 + 0]$$

$$= (x + 1)(1) + (x - 1)(1)$$

$$= (x + 1) + (x - 1) = 2x \text{ Ans}$$

$$y = (x^2 + 1)(x^3 + 3)$$

$$\frac{d}{dx}(x^2 + 1)(x^3 + 3) = (x^2 + 1) \frac{d}{dx}(x^3 + 3) + (x^3 + 3) \frac{d}{dx}(x^2 + 1)$$

$$= (x^2 + 1) \left[ \frac{d}{dx}(x^3) + \frac{d}{dx}(3) \right] + (x^3 + 3) \left[ \frac{d}{dx}(x^2) + \frac{d}{dx}(1) \right]$$

$$= (x^2 + 1)[3x^{3-1} + (0)] + (x^3 + 3)[2x^{2-1} + (0)]$$

$$= (x^2 + 1)[3x^2 + (0)] + (x^3 + 3)[2x + (0)]$$

$$= (x^2 + 1)[3x^2] + (x^3 + 3)[2x]$$

$$= 3x^4 + 3x^2 + 2x^4 + 6x$$

$$= 5x^4 + 3x^2 + 6x \text{ Ans}$$

$$y = (x - 5)(3 - x)$$

$$\frac{d}{dx}(x - 5)(3 - x) = (x - 5)\frac{d}{dx}(3 - x) + (3 - x)\frac{d}{dx}(x - 5)$$

$$= (x - 5)\left[\frac{d}{dx}(3) - \frac{d}{dx}(x)\right] + (3 - x)\left[\frac{d}{dx}(x) + \frac{d}{dx}(5)\right]$$

$$= (x - 5)[0 - 1] + (3 - x)[1 - 0]$$

$$= (x - 5)[-1] + (3 - x)[1]$$

$$= -(x - 5) + (3 - x)$$

$$= -x + 5 + 3 - x = -2x + 8 \text{ Ans}$$