

$$4) y = x^7 \cdot x$$

$$5) y = 2^x \cdot \log x$$

Ex:- Find the derivative of the following functions:

$$1) y = \frac{ax+b}{px^2+qx+r}$$

$$\therefore \frac{dy}{dx} = \frac{d}{dx} \left[\frac{ax+b}{px^2+qx+r} \right]$$

$$\because \frac{d}{dx} \frac{u}{v} = \frac{v \frac{d}{dx} u - u \frac{d}{dx} v}{[v]^2}$$

$$= \frac{(px^2+qx+r) \frac{d}{dx} (ax+b) - (ax+b) \frac{d}{dx} (px^2+qx+r)}{[px^2+qx+r]^2}$$

$$= \frac{(px^2+qx+r) (a(1)+0) - (ax+b) [p(2x)+q(1)+0]}{[px^2+qx+r]^2}$$

$$= \frac{(px^2+qx+r) a - (ax+b) (2px+q)}{(px^2+qx+r)^2}$$

$$(2) \quad y = \frac{x}{x-2}$$

$$\frac{dy}{dx} = \frac{d}{dx} \left[\frac{x}{x-2} \right]$$

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

$$= \frac{(x-2)(1) - x(1-0)}{(x-2)^2} = \frac{(x-2) - x}{(x-2)^2}$$

$$= \frac{x-2-x}{(x-2)^2} = \frac{-2}{(x-2)^2}$$

$$(3) \quad y = \frac{x^3 + 3^x}{x}$$

$$\therefore \frac{dy}{dx} = \frac{d}{dx} \left[\frac{x^3 + 3^x}{x} \right]$$

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

$$= \frac{x [3x^2 + 3^x \cdot \log 3] - (x^3 + 3^x)(1)}{x^2}$$

$$= \frac{x [3x^2 + 3^x \cdot \log 3] - x^3 - 3^x}{x^2}$$

$$4) \quad y = \frac{x^2 + 6}{2x - 7}$$

$$\therefore \frac{dy}{dx} = \frac{2(x^2 - 7x - 6)}{(2x - 7)^2}$$

$$5) \quad \frac{2x + 1}{3x - 4}$$

$$6) \quad \frac{2x + 1}{x^2 - 3}$$

$$7) \quad \frac{e^x}{x}$$