

$$3) \frac{d}{dx} [x + 7y] = 1 + 7 \frac{dy}{dx}$$

$$4) \frac{d}{dx} [xy^2] = x(2y \frac{dy}{dx}) + y^2(1)$$

Examples: Find  $\frac{dy}{dx}$

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

$$\frac{d}{dx} x^2 + \frac{d}{dx} y^2 = \frac{d}{dx} 1$$

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

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

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

$$2) 2y = x^2 + \sin y$$

$$\frac{d}{dx} 2y = \frac{d}{dx} x^2 + \frac{d}{dx} \sin y$$

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

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

$$\frac{dy}{dx} (2 - \cos y) = 2x$$

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