

→ Explicit vs. Implicit

Ex 1

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

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

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

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

Simply add notation
if you take the
derivative with
respect to a diff.
variable

Ex 2 (y' notation)

$$x^2 + \underline{3xy} + y^2 = 10 \quad \text{Find } \frac{dy}{dx}$$

$$2x + 3x(y') + y(3) + 2yy' = 0$$

$$y'(3x + 2y) = -2x - 3y$$

$$\frac{dy}{dx} \quad y' = \frac{-2x - 3y}{3x + 2y}$$

$$x^2 + y^2 = 25 \quad \text{Find } \frac{d^2y}{dx^2}$$

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

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

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

$$\frac{d^2y}{dx^2} = \frac{y(-1) - (-x)\left(\frac{dy}{dx}\right)}{y^2}$$

$$\frac{d^2y}{dx^2} = \frac{-y + x\left(\frac{-x}{y}\right)}{y^2} \cdot \frac{y}{y}$$

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

$$\frac{d^2y}{dx^2} = \frac{-25}{y^3}$$