

Implicit Differentiation

1. Core

Regard y as a function of x .

2. Example.

Find the slope of the line tangent to the graph of

$$3x^2 + 2y^2 - 4xy + 2x - 8y + 11 = 0 \quad \text{at } (1, 4).$$

$$\frac{d}{dx} [3x^2 + 2y^2 - 4xy + 2x - 8y + 11] = \frac{d}{dx} [0].$$

$$\Rightarrow 6x + 4y \cdot y' - (4y + 4xy') + 2 - 8y' = 0$$

When $x=1$, $y=4$, gives.

$$6 + 4 \times 4y' - 4 \times 4 - 4y' + 2 - 8y' = 0$$

$$\Rightarrow 8 - 16 + 4y' = 0.$$

$$\Rightarrow y' = 2.$$



