Example

Find \( \frac{dy}{dx} \) if \( x + \frac{1}{y} = 4 \).
Implicit Differentiation

Suppose an equation defines \( y \) \textit{implicitly} as a differentiable function of \( x \). To find the derivative of \( y \),

1. Differentiate both sides of the equation with respect to \( x \). Remember that \( y \) is really a \textit{function of} \( x \) and use the chain rule when differentiating terms containing \( y \).

2. Solve the differentiated equation algebraically for \( \frac{dy}{dx} \).

Example

Find \( \frac{dy}{dx} \) using implicit differentiation if \( x + \frac{1}{y} = 4 \).
Example

Find \( \frac{dy}{dx} \) if \( 4x - x^3 y^2 = 2y \).
Implicit Differentiation

Example

Find the equation of the tangent line to the curve \(x^2y^2 - 3xy = 5x + y + 1\) at the point \((0, -1)\).