

Explicit and Implicit Differentiation

A. Explicit Functions: Function y is written only in terms of the variable x ($y = f(x)$). Apply derivatives rules normally.

B. Implicit Differentiation: An expression representing the graph of a curve in terms of both variables x and y .

I. Differentiate both sides of the equation with respect to x . (terms with x differentiate normally, terms with y are multiplied by $\frac{dy}{dx}$ per the chain rule)

II. Group all terms with $\frac{dy}{dx}$ on one side of the equation and all other terms on the other side of the equation.

III. Factor $\frac{dy}{dx}$ and express $\frac{dy}{dx}$ in terms of x and y .

Implicit Differentiation

$$2x + y^2 = y$$

$$2 + 2yy' = y'$$

$$2yy' - y' = -2$$

$$y'(2y - 1) = -2$$

$$y' = \frac{-2}{2y - 1}$$