

3.7 Implicit Differentiation

EXAMPLE: Find $\frac{dy}{dx}$ if $xy + y = 3$.

EXAMPLE: Find $\frac{dy}{dx}$ if $x^3 - 2y^2 + y = 4$.

EXAMPLE: Find $\frac{dy}{dx}$ if $xy + y = 3$.

EXAMPLE: Use implicit differentiation to find $\frac{dy}{dx}$ if $x^2y + y^2x = -2$.

EXAMPLE: Use implicit differentiation to find $\frac{dy}{dx}$ if $(2xy + 3)^2 = \sin y$.

EXAMPLE: Solve for $\frac{dy}{dx}$ by using implicit differentiation: $e^{xy} + x^2 - y^2 = 10$.

EXAMPLE: Use implicit differentiation to find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ if $x^3 + y^3 = 8$.

EXAMPLE: Verify that $(2, 1)$ is on the curve $x^3 + y^3 = 4xy + 1$. Then find lines that are **(a)** tangent and **(b)** normal to the curve at $(2, 1)$.

EXAMPLE: Verify that $(1, 0)$ is on the curve $2 \cos(\pi x - y) - y = -2x$. Then find lines that are **(a)** tangent and **(b)** normal to the curve at $(1, 0)$.

EXAMPLE: You are given that $x \cdot \cos y = 1$. Find $\frac{dy}{dx}$ by implicit differentiation and evaluate the derivative at the given point, $\left(2, \frac{\pi}{3}\right)$.