

Advanced Techniques

6.3 – Explicit vs Implicit Differentiation

Explicit vs Implicit

Explicit Function: A function written in the form $y = f(x)$, where y is defined in terms of x alone.

If $x^2 + y^2 = 100$ find y' using explicit differentiation.

Implicit Function: A function where y is defined by an *equation in x and y* , such as $x^2 + y^2 = 100$.

If $x^2 + y^2 = 100$ find y' using implicit differentiation.

Find the slope of the circle $x^2 + y^2 = 100$ at the point $(6, 8)$

Find the slope of the circle $x^2 + y^2 = 100$ at the point $(6, 8)$

Find the slope of the circle $x^2 + y^2 = 9$ at the point $(-6, 8)$

Find the slope of the circle $x^2 + y^2 = 9$ at the point $(-6, 8)$

Advanced Techniques

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Ex A: Find each derivative implicitly or explicitly.

#1) $\frac{d}{dx}y^{10}$

#4) $\frac{d}{dx}x$

#2) $\frac{d}{dx}x^{10}$

#5) $\frac{d}{dx}y$

#3) $\frac{d}{dx}(x^5y^7)$

#6) $\frac{d}{dx}(5x^3y^2)$

Advanced Techniques

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Method for finding dy/dx from an equation that defines y implicitly involves three steps:

1. Differentiate both sides of the equation *with respect to x* .
2. Collect all terms involving $\frac{dy}{dx}$ on one side, and all others on the other side.
3. Factor out the $\frac{dy}{dx}$ and solve for it by dividing.

Ex B: Finding and Evaluating an Implicit Derivative

For $x^4 + y^4 - 2x^2y^2 = 10$ find $\frac{dy}{dx}$ and evaluate it at $x = 2, y = 1$.

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Consumer Demand

In economics, a demand equation is the relationship between the price p of an item and the quantity x that consumers will demand at that price. (All prices are in dollars, unless otherwise stated).

Ex C: Interpreting an Implicit Derivative

For the demand equation $x = \sqrt{1900 - p^3}$ find $\frac{dp}{dx}$. Then evaluate it at $x = 30$, $p = 10$ and interpret your answer.

Implicitly

Explicitly

With intelligence