

Implicit Differentiation

by

Mary Ann Connors

Department of Mathematics
Westfield State College
Westfield, MA 01086

Textbook Correlation: Key Topic

- Derivatives

NCTM Principles and Standards:

- Process Standard
 - Representation
 - Connections

Implicit Differentiation

Exercises:

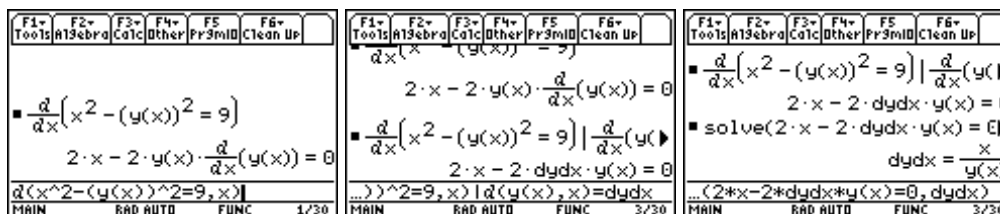
1. Given $x^2 - y^2 = 9$, compute $\frac{dy}{dx}$ using implicit differentiation.

Solution:

Taking the derivative of $x^2 - y^2 = 9$ with respect to x on the calculator treats y as a constant. Instead, take the derivative of $x^2 - y(x)^2 = 9$ with respect to x . Why?

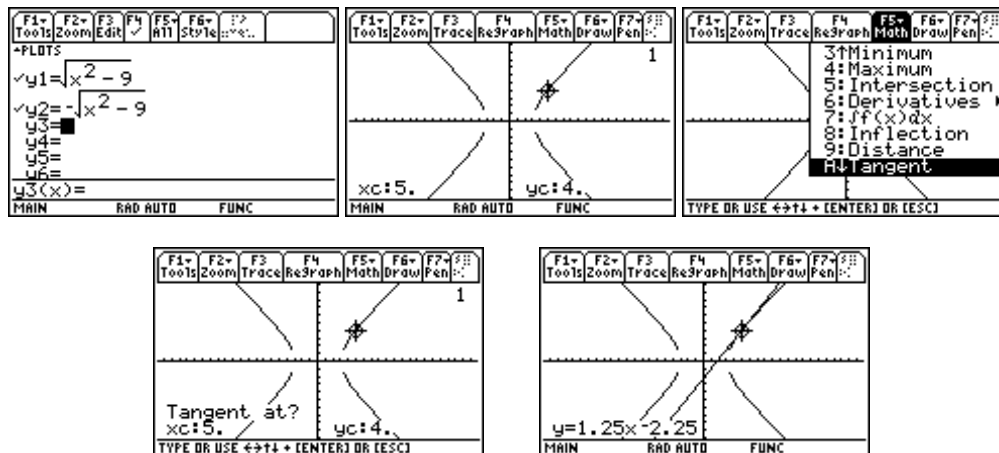
Solve for $\frac{dy}{dx}$ by replacing the derivative notation with the variable name “ $dydx$.”

Evaluate the variable “ $dydx$ ” using the solve command. Reproduce the screens illustrated below.

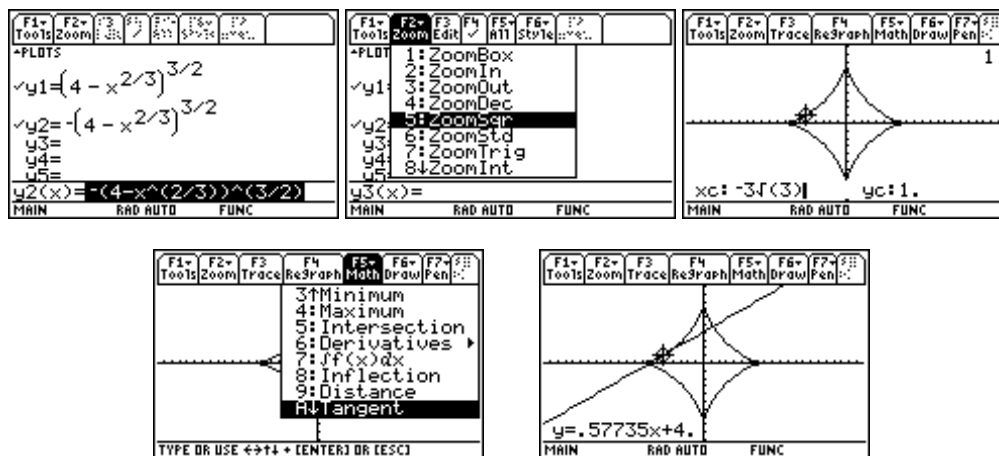


2. Evaluate $\frac{dy}{dx}$ at the point (5,4). **Answer:** 5/4.

3. Use the TI-89 (TI-92 Plus) to graph the hyperbola $x^2 - y^2 = 9$ and draw the tangent line at the point (5,4). Did you get the same results?



4. Use implicit differentiation to find an equation of the tangent line to the asteroide $x^{2/3} + y^{2/3} = 4$ at the point $(-3(3)^{1/2}, 1)$. Use the TI-89 (TI-92 Plus) to graph the asteroide and draw the tangent line as illustrated in Exercise 3. Did you get the same results?



4. Given $12x^2 + 3xy^2 - 7y = 0$, compute $\frac{dy}{dx}$ using implicit differentiation.