

Unit 4

More with Derivatives

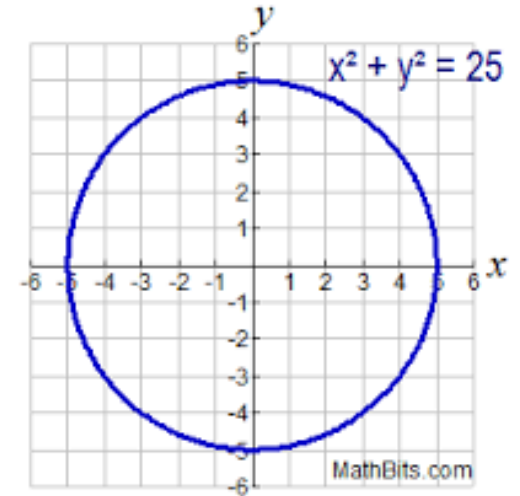
Section 3.7 Implicit Differentiation

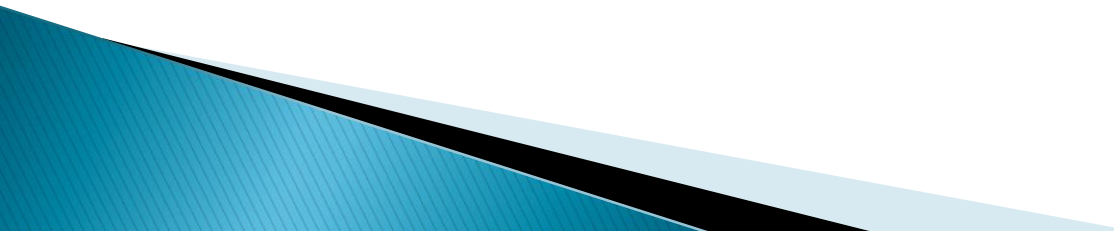


- ▶ Have you noticed that all the functions we have differentiated have been solved for y ?
- ▶ When an equation is solved for y , it is an explicit function.
- ▶ Find $\frac{dy}{dx}$ if $x^2 + y^2 = 25$. Then write the equation of the tangent line at $(3, 4)$.

$$x^2 + y^2 = 25 \quad \text{at } (3, 4)$$

$$y = \pm\sqrt{25 - x^2}$$



- ▶ It is not necessary to solve for y first.
 - ▶ An equation not solved for y is an implicit function.
 - ▶ Using implicit differentiation, we will differentiate each side of the equation with respect to x .
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Write the equation of the tangent line at (3, 4).

▶ $x^2 + y^2 = 25$

Remember,
x is the variable
y is the function composed
of x

Find y' if $x^3 + y^3 = 6xy$

- ▶ Impossible to solve for y , so you must use implicit differentiation.

Find tangent line at $(3, 3)$

Find y' if $\sin(x + y) = y^2 \cos x$