

Implicit differentiation

- ◆ **Step 1:** Take the derivative of each side of the equation with respect to x (remembering to treat y as a function of x), and apply the rules of differentiation.
- ◆ **Step 2:** You have now an ordinary linear equation where the unknown you want to solve for is $\frac{dy}{dx}$. Solve it!
- ◆ **Step 3:** Substitute the coordinates of your point in the formula for $\frac{dy}{dx}$ you just obtained. This is the slope of the tangent line to the curve at the given point!
- ◆ **Step 4:** Find an equation of the tangent line, by using the slope and the coordinates of the point.

Related rates problem

- ◆ **Step 1:** Understand the problem - Draw a picture - Find and name the quantities which are related.
- ◆ **Step 2:** Write what you know and what you wish to find!
- ◆ **Step 3:** Find how the quantities are related (i.e. find a suitable equation which relates the quantities).
- ◆ **Step 4:** Differentiate the above equation (so that the related quantities will give you the related rates).
- ◆ **Step 5:** Solve for the unknown quantity and replace the known data (with unit of measures).

Logarithmic differentiation

You want to differentiate the function $f(x)$ by using logarithmic differentiation:

- ◆ **Step 1:** Set $y = f(x)$.
- ◆ **Step 2:** Take the natural logarithm both sides in the equation $y = f(x)$ and use the Laws of Logarithms to simplify your right-hand expression.
- ◆ **Step 3:** Differentiate both sides implicitly with respect to x .
- ◆ **Step 4:** Solve your resulting equation for $\frac{dy}{dx}$ and, at the end, do not forget that $y = f(x)$...