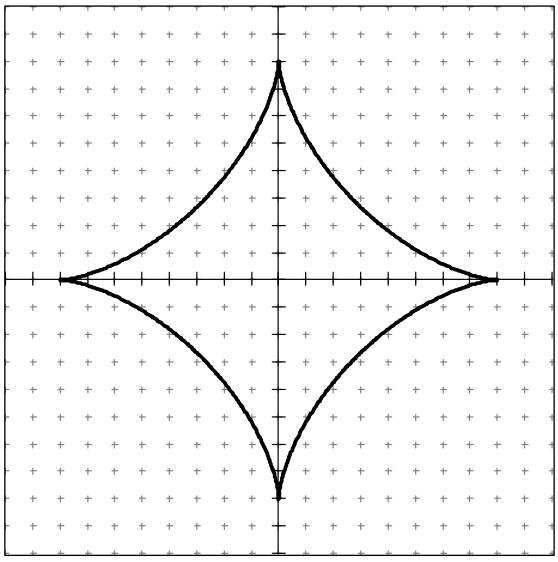
Analysis 1A Name_____
Rose

More Implicit Differentiation Practice



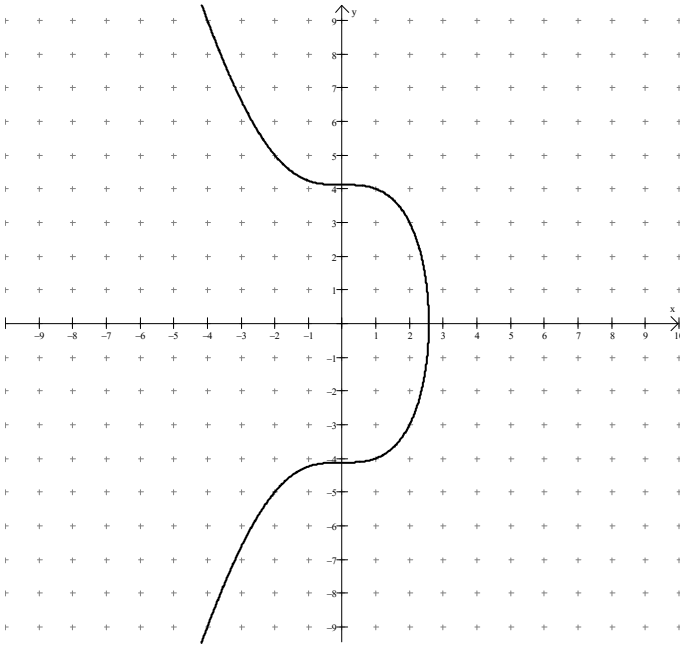
1. Given the relation $x^{\frac{2}{3}} + y^{\frac{2}{3}} = 4$
   a. Find equations of the four lines that are tangent to the graph whose slopes are either 1 or -1.

   b. Find the area of the square formed by the tangents found in part a.

   c. Show that this curve is not "smooth" by showing that the derivative does not exist at $(0, 8)$. Consider the behavior of $\frac{dy}{dx}$ from both sides.

   d. Show that this curve can be parameterized by
   $x = 8\cos^3 t$
   $y = 8\sin^3 t$

2. Given the relation $x^3 + y^2 = 17$, graphed below



   a. Find $\frac{dy}{dx}$ in general.

   b. Find $\frac{dy}{dx}$ at the points when $y = 9, y = 5, y = -5,$ and $y = -9$.

      Check that the answers are consistent with the graph.

   c. Find the equations of the tangent lines to the curve when $x = 2$.

   d. Find the equations of any horizontal or vertical tangent lines.

   e. Find $\frac{d^2y}{dx^2}$

3. A circle with a radius of 1 and centered on the y-axis is inscribed in the parabola $y = 2x^2$. Determine the two points of intersection.

(Hint: the derivatives are equal at the points of intersection)