2.5 Notes and Examples

Name: Block: Seat:

Implicit Differentiation

Implicit vs. Explicit:

Explicit Examples:

Implicit Examples:

1. Use the chain rule as you differentiate with respect to x:
   (a) $\frac{d}{dx}\left[x^3\right] =$

   (b) $\frac{d}{dx}\left[y^3\right] =$

   (c) $\frac{d}{dx}\left[x + 3y\right] =$

   (d) $\frac{d}{dx}\left[xy^2\right] =$

Ok, now we use this to differentiate both sides of an equation....

Guidelines for Implicit Differentiation

1. Differentiate both sided of the equation with respect to ______________

   (or sometimes ______________ or some other variable)

2. Collect all terms involving ______________ (or ______________) on the left side of the equation, and move all other terms to the ______________ side of the equation.

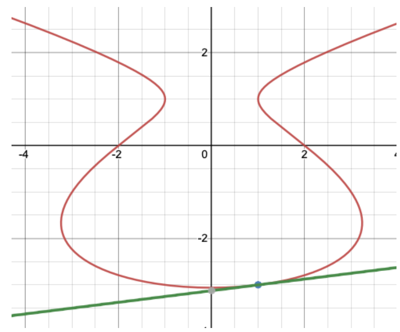
3. ______________ $\dfrac{dy}{dx}$ $\left(\text{or } \dfrac{dy}{dt}\right)$ out of the side of the equation.

4. ______________ for ______________ (or ______________).

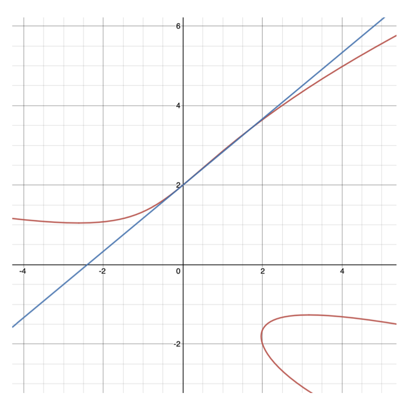
2. Find $\dfrac{dy}{dx}$ given that $y^3 + y^2 - 5y - x^2 = -4$

3. Find the tangent line of the circle $x^2 + y^2 = 25$ at the point $(4, 3)$.

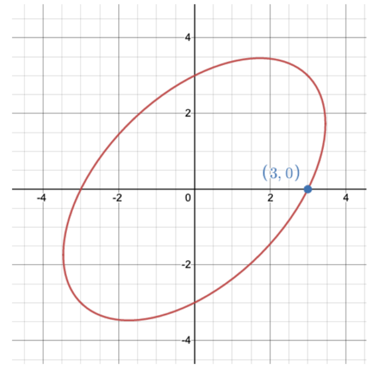
4. Consider the curve $y^3 + y^2 - 5y - x^2 = -4$. What is the slope of the tangent line at $(1, -3)$?



5. Find the tangent line equation for $y^3 - 5xy - x^2 = 8$ at the point $(0, 2)$



6. Consider the Ellipse $x^2 - xy + y^2 = 9$



(a) Find the tangent line at the point $(3, 0)$

(b) Find the coordinates of the points when the tangent line is horizontal.

(c) Find the coordinates of the points when the tangent line is vertical.