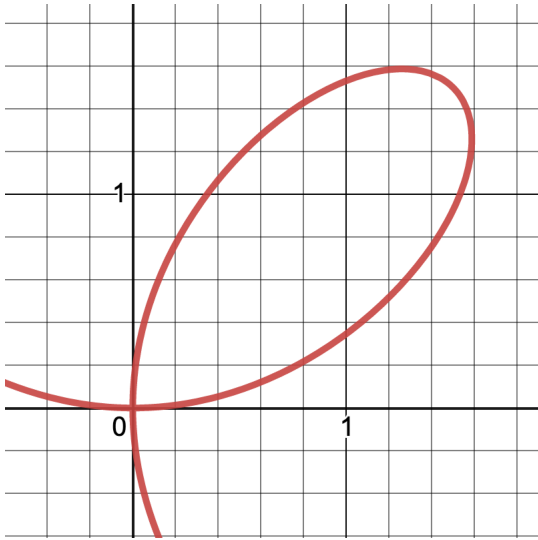


SECTION 3-8: IMPLICIT DIFFERENTIATION

1. Motivating questions: How can we find slope of the tangent / velocity for a graph that looks like the one below?



Tangent line to  $y^3 + x^3 = 3xy$  at  $(3/2, 3/2)$ ?

2. What is  $\frac{d}{dx} [(f(x))^3]$  ?

3. Repeat question 2 above but with Leibniz notation assuming  $y = y(x)$ . Find  $dy/dx$  for  $(y)^3$ .

4. Find  $\frac{d}{dx} [3xg(x)]$ .

5. Find  $dy/dx$  for  $3xy$  assuming  $y = y(x)$ .

6. Find  $dy/dx$  for each expression below.

(a)  $x^2 + y^3 = \cos(x) + \sin(y) + \pi/2$

(b)  $y \cos(x) + 2x = (y + 1)^2$

(c)  $x + \tan(xy) = 5$

7. For the equation  $x^2 + xy + y^2 = 9$ ,

(a) Find the  $x$  intercept(s).

(b) Find the slope of the tangent lines at the  $x$ -intercepts.

(c) Write the equations of the tangent lines at the  $x$ -intercepts.