

Implicit Differentiation

Goal:

- Can describe apply chain rule to find the derivative across functions of different variables and solve for the desired rate of change.

Terminology:

- Implicit Differentiation

Reminder:

- Quiz on Thursday November 14
- Test on November 20

Review and practice chain rule.

1. Find dy/dx for $y = (3x^2 + 1)^3$

2. Find dy/dx for $y = (5x^3 - x^4)^7$

3. Given the following values of x, f, g determine $\frac{d}{dx}f(g(x))$ and $\frac{d}{dx}g(f(x))$ at $x = 0$

x	$f(x)$	$g(x)$	$f'(x)$	$g'(x)$
0	1	1	5	1/3
1	3	-4	-1/3	-8/3

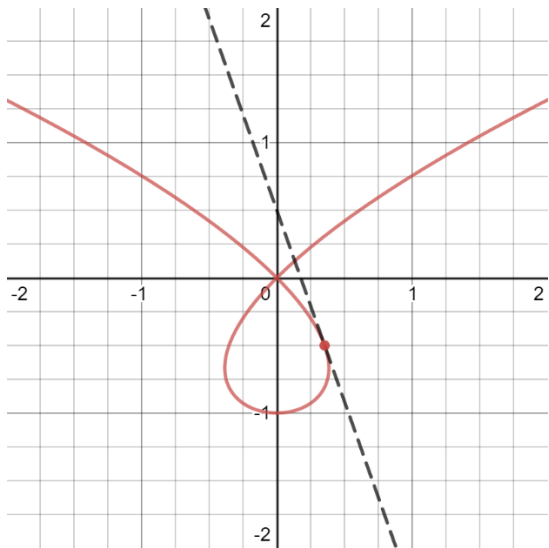
4. Find the equation to tangent line at $x = 3$ for the curve

$$y = \sqrt{x + \sqrt{x^2 + 27}}$$

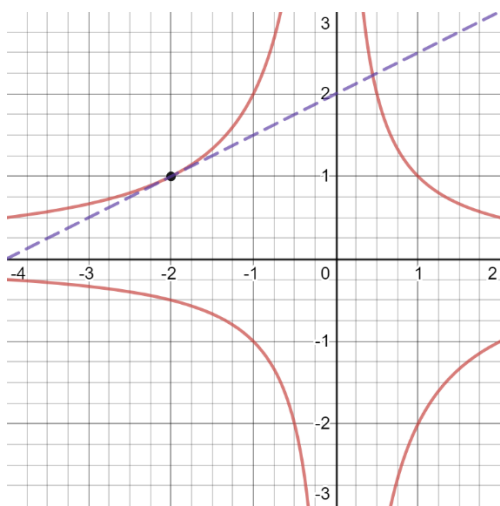
5. For the equation $PV = RT$ where the **changing variables** are P (pressure), V (volume), and T (temperature). In this equation R is a constant and not changing. Find an equation for the change in Pressure as Volume changes.

We want to introduce one major application of chain rule which number 5 alludes to. Implicit differentiation has to do with finding the slope, dy/dx , of **relations** (not necessarily functions) such as:

What is the slope of the relation $x^2 - y^3 = y^2$ at the point $(\frac{1}{\sqrt{8}}, -\frac{1}{2})$



Practice: What is the slope of the relation $xy + x^2y^2 = 2$ at the point $(-2,1)$



Practice Problems: 2.7: # 1-3 (do what you need), 4-5 (don't sketch – use Desmos), 8, 9



6, 7, 11

