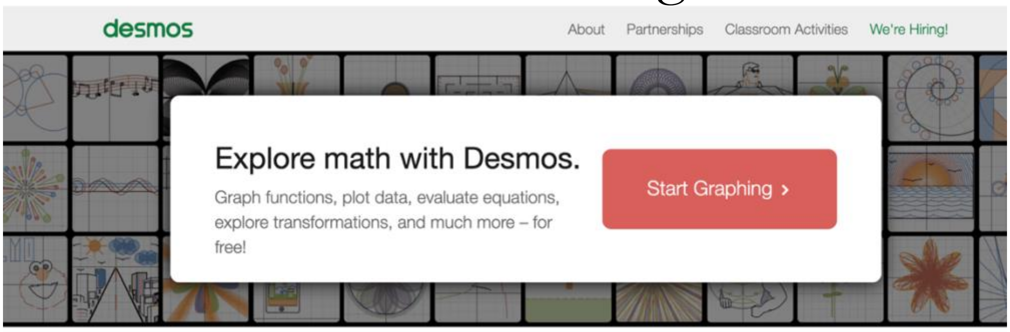
Splash 2019 A13166: Drawing with Functions



Alright Alright! Is everyone hyped yet for some FUNctions?
Welcome to A13166: **Drawing with Functions** at Splash 2019!

In this short 50-minute crash course, we will be exploring (and potentially coming up with) various ways to draw all types of stuff and/or make art with mathematical functions through a few simple exercises. You are free to create your own projects from beginning to end, but you are a total beginner in Desmos, then we strongly suggest you follow along!

Before we get into it, though, let's remember one important thing: **You do not have to 100% understand the behaviors of the expressions you are graphing; more often, it is more important to understand how a specific type of function behave.** One of the goals of this class is for us to realize that mathematics, though seemingly formulaic, can be utilized with much more freedom during creative processes. Don't be discouraged if you don't yet know some of the math that we mention in this class – regardless of your mathematical background, $\lim(creativity) = \infty$ (creativity is always limitless!)

I shall make another disclaimer – some of the expressions we use are **not actually functions, at least in Cartesian coordinates**. For example, the expression x = 0, and many conic section expressions (circles, ellipses, hyperbola…), are not functions because they fail the vertical line test. While many of those could be functions using polar coordinates or parameters, writing them out in polar coordinates could be unnecessarily challenging. For the record, **we usually leave expressions in the cleanest coordinate system and form.**

There really aren't too many functions that you have to remember. But just as reference, I start with some of those ideas:

- Line: y = mx+b, m = slope; b = y-intercept; line "rises" when m > 0.
- Line: (y-k) = m(x-h), (h,k) = a point on the line
- Circle: $x^2 + y^2 = r^2$, r = radius, in Cartesian coordinate
- Circle: $r = \cos(\theta)$ in polar coordinates
- Spiral: $r = \theta$ in polar coordinates
- Trig: know what sin, tan, and sec look like.
- Powers of x: when power is even, x looks like a bowl (or parabola, I guess). The bigger the power is, the steeper the graph becomes. When power is odd, the graph looks like a flying superman.
- You can make very cool stuff when you put powers of y and x together in an expression…

I am also attaching a FUNction exercise sheet that I found helpful with both Desmos and high school (if you wanted to get up and stretch, try some of those poses!)