Pre-Calculus Review: Everything you should have learned from Math 1113.

1. Basic Algebra tools:
   (a) Evaluating functions.
   (b) Factoring quadratics and the Quadratic Formula.
   (c) Composition of functions.
   (d) Pythagorean Theorem.
   (e) Interval Notation.
2. Domain of functions:
   (a) Division by zero
   (b) Even radicals and properties of roots.
   (c) Logarithms.

   EXAMPLE: Determine the domain of $f(x) = \dfrac{x^2+10}{x-6} + \sqrt{x+10} - \ln(9-x)$.
3. Graphs of the following functions:
   (a) Basic: $|x|$, x^2, x^3, $\frac{1}{x}$, $\sqrt{x}$.
   (b) Exponential/Logarithmic: $\mathbf{e}^x$, $\ln(x)$.
   (c) Trig/Arctrig: $\sin(x)$, $\cos(x)$, $\tan(x)$, $\cot(x)$, $\sec(x)$, $\csc(x)$, $\arcsin(x)$, $\arccos(x)$, $\arctan(x)$.

   Using these building blocks, you should be able to reflect and translate accordingly.
4. Trig Properties:

$$\csc(\theta) = \frac{1}{\sin(\theta)} \qquad \sec(\theta) = \frac{1}{\cos(\theta)} \qquad \cot(\theta) = \frac{1}{\tan(\theta)} \qquad \tan(\theta) = \frac{\sin(\theta)}{\cos(\theta)} \qquad \cot(\theta) = \frac{\cos(\theta)}{\sin(\theta)}$$

$$\sin^2(\theta) + \cos^2(\theta) = 1 \qquad \tan^2(\theta) + 1 = \sec^2(\theta) \qquad 1 + \cot^2(\theta) = \csc^2(\theta)$$

5. Geometry formulas:

Circle A $= \pi r^2$ P $= 2\pi r$	Rectangle A $= lw$ P $= 2l + 2w$ A $= bh$	Triangle A $= 0.5bh$ P = sum of three sides A $= 0.5ab\sin(\theta)$ for side-angle-side
Sphere V $= \frac{4}{3}\pi \cdot r^3$ SA $= 4\pi \cdot r^2$	Rectangular Box V $= lwh$ SA = sum of six faces	Right Circular Cylinder V $= \pi r^2 h$ SA $= 2\pi r^2 + 2\pi rh$

What is a polynomial?

You will hear this term thrown a lot in math, and one major concept you'll be using a lot in calculus is that **All polynomials are continuous everywhere.** This then begs the question, *What is a polynomial?*

We start by talking about monomials. A **monomial** is a term that looks like: ax^n, where a is a real valued coefficient and n is a non-negative counting (whole) number. Examples are: $4x^3$, $5x/3$, and 7.

When you add and/or subtract more than one monomial, your result is a polynomial, hence the prefix. An example of a polynomial is $4x^3 + 5x/3 - 7$.

One very important fact is that the domain of polynomials is $(-\infty, \infty)$.

You can add, subtract, and multiply two or more polynomials, and the result will *still be a polynomial*. For example, if $f(x) = 4x^3 + 5$ and $g(x) = 7x - 3$, then $(f+g)(x)$, $(f-g)(x)$, and $(fg)(x)$ will result in polynomials.

When you divide two polynomials, the resulting function is called a **rational function**.
An example of a rational function is $(f/g)(x) = \dfrac{4x^3+5}{7x-3}$. Notice that when $x = 3/7$, then your function does not exist, and thus your domain is no longer $(-\infty, -\infty)$.