More Functions

Expoential Functions

- These are functions of the form $f(x) = b^x$
- These grow really fast (or shrink)
- For any expoential function, f(x), f(0) = 1
- Properties:
  - $b^x b^y = b^{x+y}$
  - $b^x c^x = (bc)^x$
  - $(b^x)^y = b^{xy}$

Trig Functions

- Triangles and circles are your friends
- $\sin(x) = O/H$ $\quad 1/\sin(x) = \csc(x) = H/O$
- $\cos(x) = A/H$ $\quad 1/\cos(x) = \sec(x) = H/A$
- $\tan(x) = O/A$ $\quad 1/\tan(x) = \cot(x)$

- $\sin^2(x) + \cos^2(x) = 1$

Hyperbolic Functions

- Have you heard of these?

Inverses

- An inverse is an "undo" function
- Mathematicians like undoing things
- To calculate an inverse just swap x and y
- Common Inverses in Math
  - Additive Inverse
  - Multiplicitive Inverse
  - Power Inverse
  - Exponential Inverse
  - Trig Inverses

Is there an Inverse?

- Not all functions have inverses, e.g. f(x) = 10
- Invertable functions must be 1-1 and onto
- A way to test this is the horizontial line test

What do Inverses Look Like?

- Swaping x and y is like mirroring the x-y plane along y=x
- Inverses look like "flipped" versions of their normal counterpart

Logs (not the fireplace ones)

- Since we can't solve $x = b^y$ we invented a new term
- $x = b^y$ is the same as $\log_b(x) = y$
- Properties of logs:
  - $\ln(x) = \log_e(x)$
  - $\log_b(x\ y) = \log_b(x) + \log_b(y)$
  - $\log_b(x / y) = \log_b(x) - \log_b(y)$
  - $\log_b(x^p) = p \log_b(x)$
  - $\log_b(b) = 1$

Trig Inverses

- Since we can't solve $x = \sin(y)$, $x = \cos(y)$ or $x = \tan(y)$ we invented new terms
- We use $\sin^{-1}(x)$ to denote inverse sin
- Because trig functions aren't 1-1 we limit them so they are

Homework due Monday

- Homework 1
- Know your functions
  - Lines, Parabolas and Polynomials
  - Rational and Algebraic Functions
  - Be able to make a sketch
- Hopefully most of this was review
- Next week: Limits