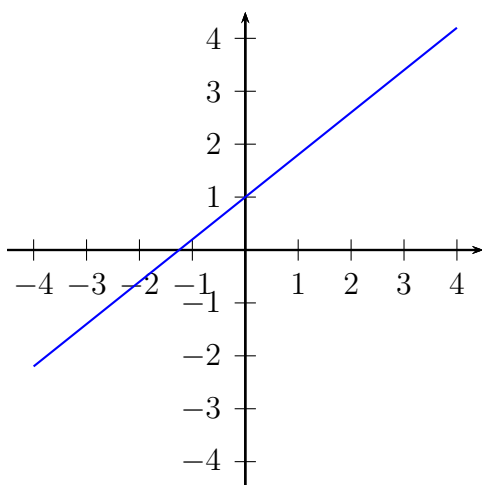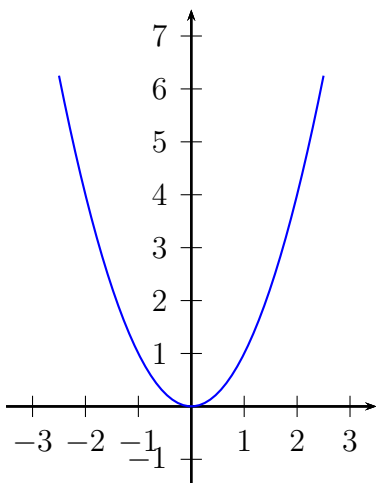# MATH 6: ASSIGNMENT 16. GRAPHS.

Today we discussed plotting graphs of some basic functions. We began with the graphs of standard functions:
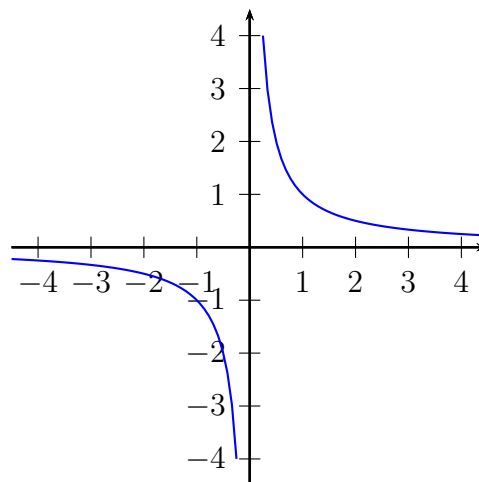
Linear function: $y = mx + b$**:** The graph of this function is a straight line. The coefficient m is called the *slope*.
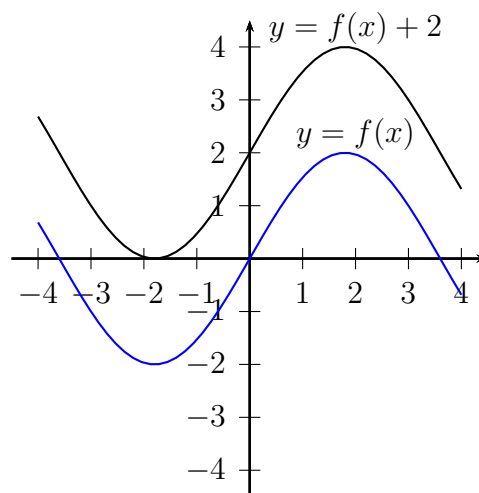
Inverse function: $y = 1/x$**:**

Having this basic graphs, we can produce new graphs, by doing certain transformations of the equations. Here are some of them; we will discuss more next time.

Vertical translations: Adding   constant c to the right-hand side of equation shifts the graph by c units up (if c is positive; if c is negative, it shifts by $|c|$ down.)

Parabola: $y = x^2$**:**

1. For each of the equations below, draw the graph, then draw the perpendicular line (going through the point $(0, 0)$) and then write the equation of the perpendicular line

$$\text{(a) } y = 2x \qquad \text{(b) } y = 3x$$

$$\text{(c) } y = -x \qquad \text{(d) } y = -\frac{1}{2}x$$

   Can you determine the general rule: if the slope of a line is k, what is the slope of the perpendicular line?

2. Draw the graphs of the following functions:
   (a) $y = 2|x|$
   (b) $y = |x + 1|$

3. (a) Sketch the graphs of functions $y = |x + 1|$ and $y = -x + 0.25$.
   (b) How many solutions do you think this equation has?

$$|x + 1| = -x + 0.25$$

   Note: you are not asked to find the solutions just answer how many are there.

4. Find the distance between the following pairs of points in the plane (hint: do you remember the Pythagorean theorem?)

$$\text{(a) } (0, 0) \text{ and } (1, 1) \qquad \text{(b) } (0, 0) \text{ and } (3, 4)$$

$$\text{(c) } (0, 0) \text{ and } (-1, 2) \qquad \text{(d) } (2, 2) \text{ and } (0, 6)$$

5. Find the equation of the line through $(1, 1)$ with slope 2.

6. Find the equation of the line through points $(1, 1)$ and $(3, 7)$. [Hint: what is the slope?]

7. Sketch graphs of the following functions:

$$\text{(a) } y = (x - 1)^2 + 1 \qquad \text{(b) } y = \frac{1}{x + 2} + 1 \qquad \text{(c) } y = \frac{1}{2 - x}$$

$$\text{(d) } y = |x| \qquad\qquad \text{(e) } y = |x + 1| \qquad\qquad \text{(f) } y = \frac{x + 2}{x + 1}$$

$$\text{(g) } y = |x + 1| + |x - 1| \qquad \text{(h) } y = \left| \frac{1}{x - 1} + 1 \right|$$