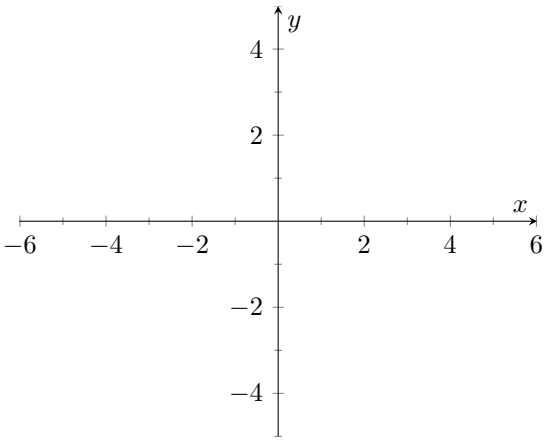
MATH 6: EUCLIDEAN GEOMETRY 9

1. Graphs

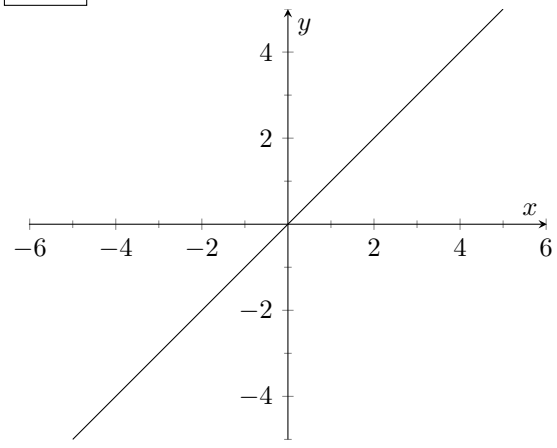
In our work from last week, we discussed the definition of coordinate axes, the xy-plane, and graphs. There is a standard way to draw an xy-coordinate plane, and it's a picture that will likely be familiar to you as you see examples of graphs of functions elsewhere in your mathematical adventures. Today, we are going to draw some graphs!

We draw the x-coordinate horizontally, and the y-coordinate vertically. Then we mark distances along the axes at regular intervals. Here:

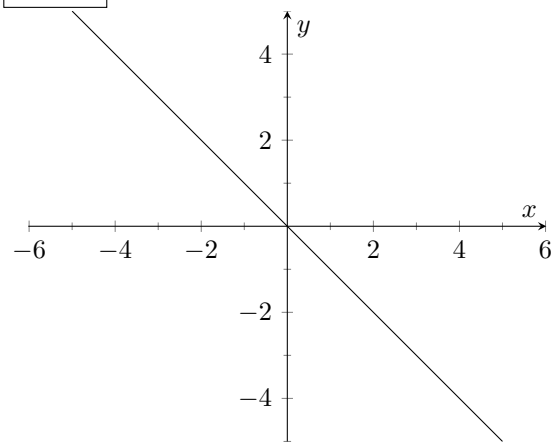


Let's graph two simple lines. These are graphs you should know how to draw.

$y = x$



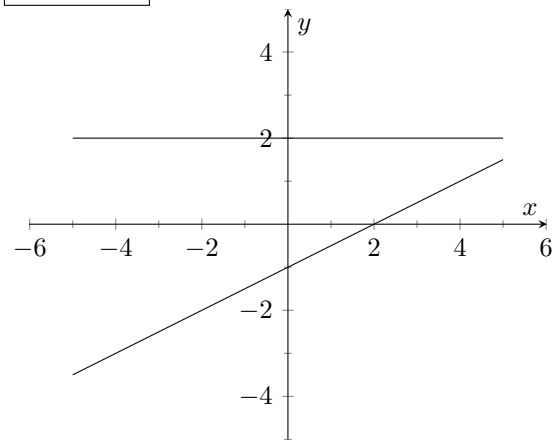
$y = -x$



You may put more than one graph in the same drawing. Here are some examples.

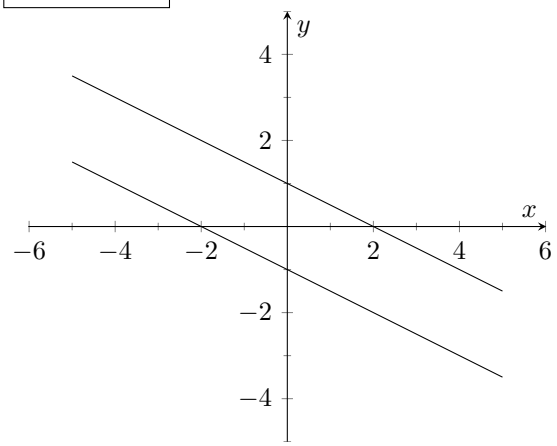
$y = 2$

$y = \frac{1}{2}x - 1$



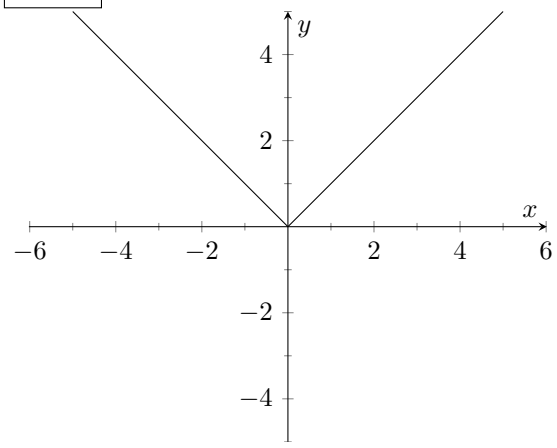
$y = -\frac{1}{2}x + 1$

$y = -\frac{1}{2}x - 1$

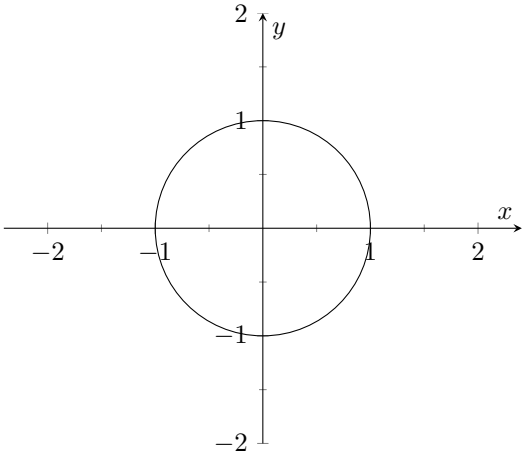


Here are some more graphs of functions that you should know how to draw.

$y = |x|$

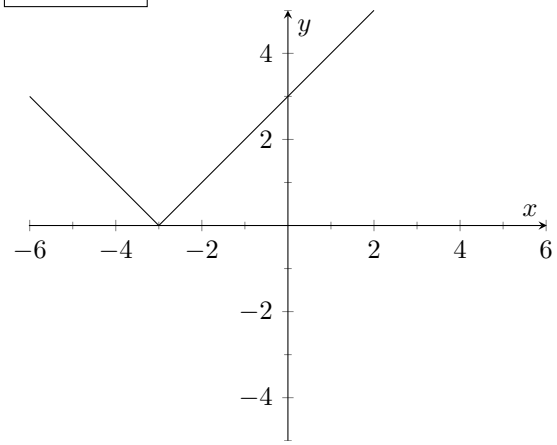


$x^2 + y^2 = 1$



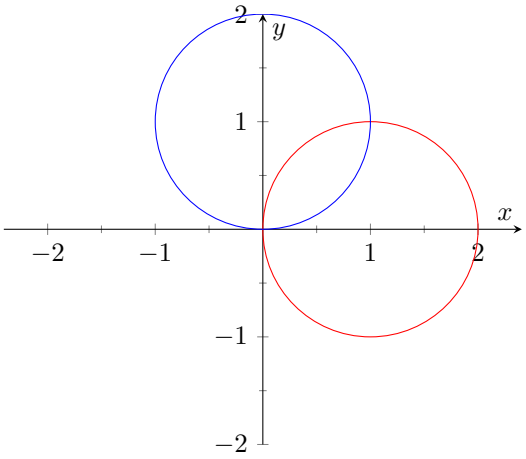
Here is a concept you should know about: when you add a constant to x or y, the graph will shift in the opposite direction by that amount. So, for example, $y = |x+1|$ should look the same as the graph of $y = |x|$ except shifted one unit in the *negative* x direction.

$y = |x + 3|$

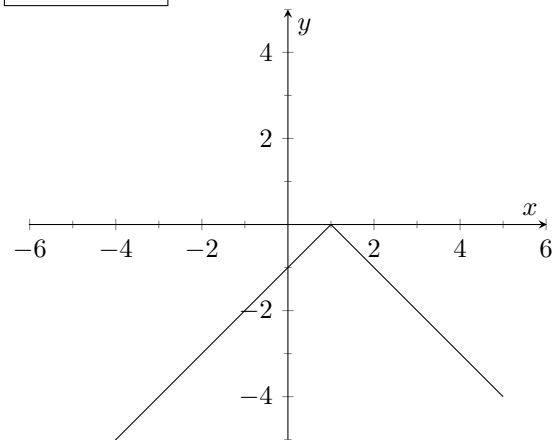


$(x-1)^2 + y^2 = 1$

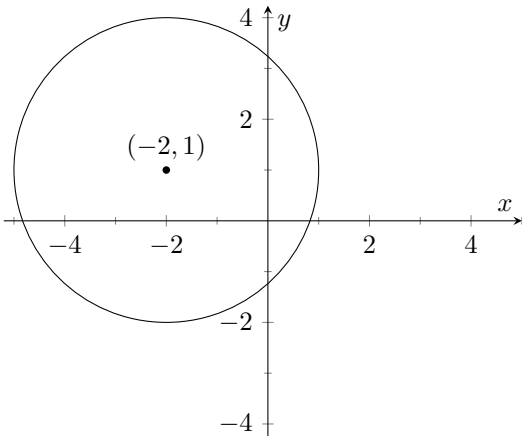
$x^2 + (y-1)^2 = 1$



$y = -|x - 1|$



$(x+2)^2 + (y-1)^2 = 9$



A useful tip for helping plot functions, when you don't know where to start, is to plug in some x values and calculate the y values, and then plot those points.

2. Homework

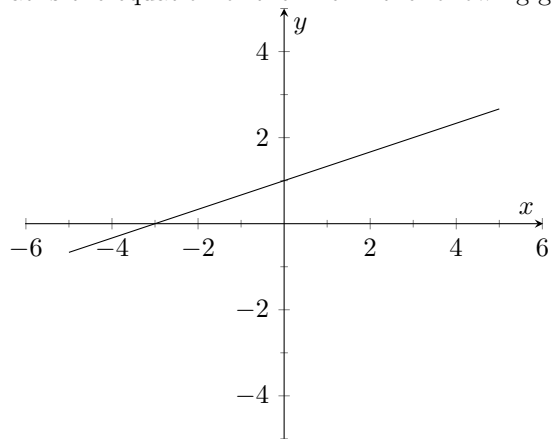
1. Graph the following equations in separate drawings.

(a) $y = -2x + 1$
(b) $y = \frac{1}{3}x + 1$
(c) $y = 2.5x + 0.5$
(d) $y = -|x|$
(e) $y = |x| + 2$
(f) $y = |x - 2| + 2$
(g) $(x - 1)^2 + (y - 1)^2 = 4$

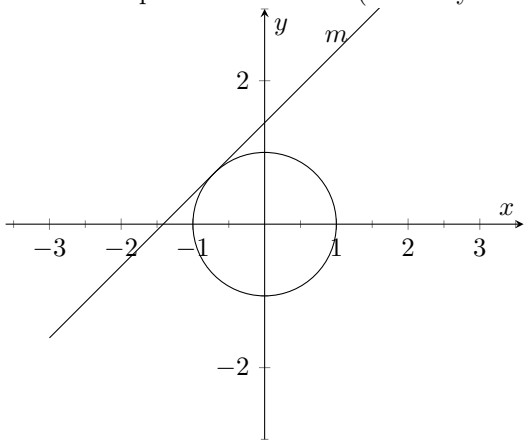
2. Graph the following equations in separate drawings.

(a) $(y + 1) + 2(x + 1) = 1$
(b) $\frac{1}{2}(y - 2) + 2(x - \frac{1}{2}) = 0$
(c) $|y| = x$
(d) $|y| = x + 1$
(e) $|y + 1| = x$
(f) $(x + y)^2 + (x - y)^2 = 1$

3. What is the equation of the line in the following graph?



4. What is the equation of line m? (You may assume that line m has slope 1.)



5. (a) In the following graph, the median from A to $\overline{BC}$ in triangle $\triangle ABC$ is drawn. What is the equation of this line?

(b) Write down the equation of the median line from B to $\overline{AC}$; then, find the coordinates of its intersection point with the median from A to $\overline{BC}$.