Name _____
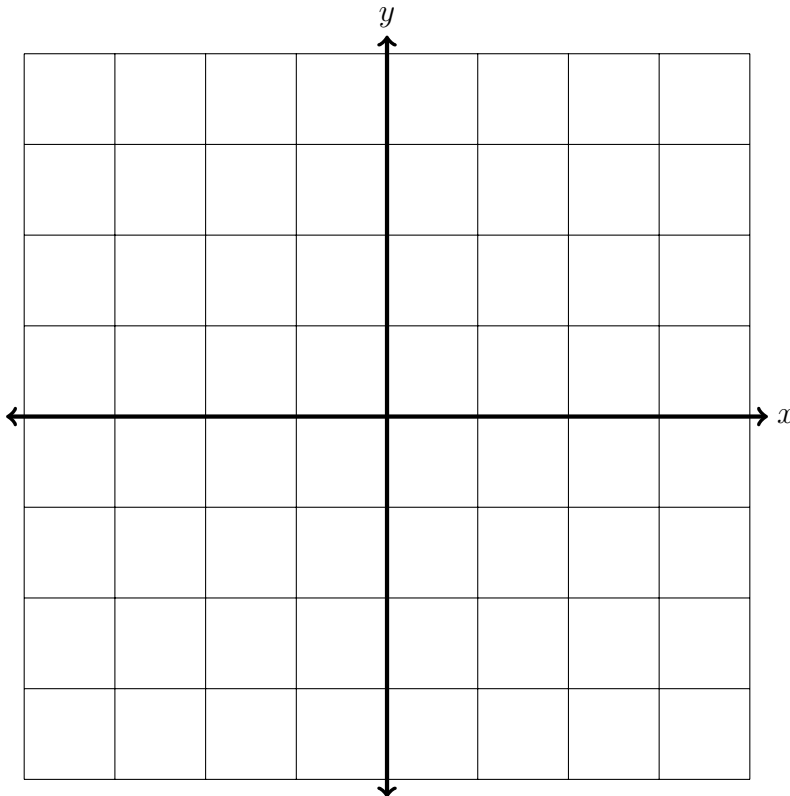
1. Consider the following piecewise-defined function.

$$f(x) = \begin{cases} |x| & x < -2 \\ x + 1 & -2 \le x \le 1 \\ (x - 3)^2 & x > 1 \end{cases}$$

(a) Find $f(-2.01)$

(b) Find $f(-2)$

(c) Find $f(-1.99)$

(d) Find $f(0)$

(e) Find $f(1)$

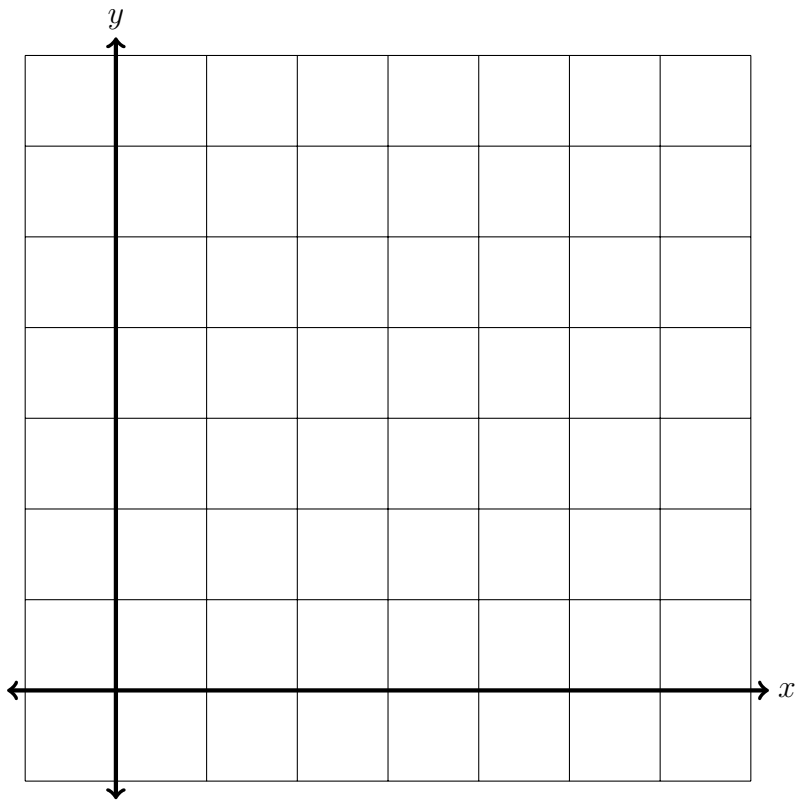(f) Find all values x such that $f(x) = 0$.

(g) Graph the function.

(h) What is the domain of the function? (i.e. what can go in?)

(i) What is the range of the function? (i.e. what can come out?)

2. Plot the following functions, and plot at least four points (using a calculator to compute decimal approximations if necessary)
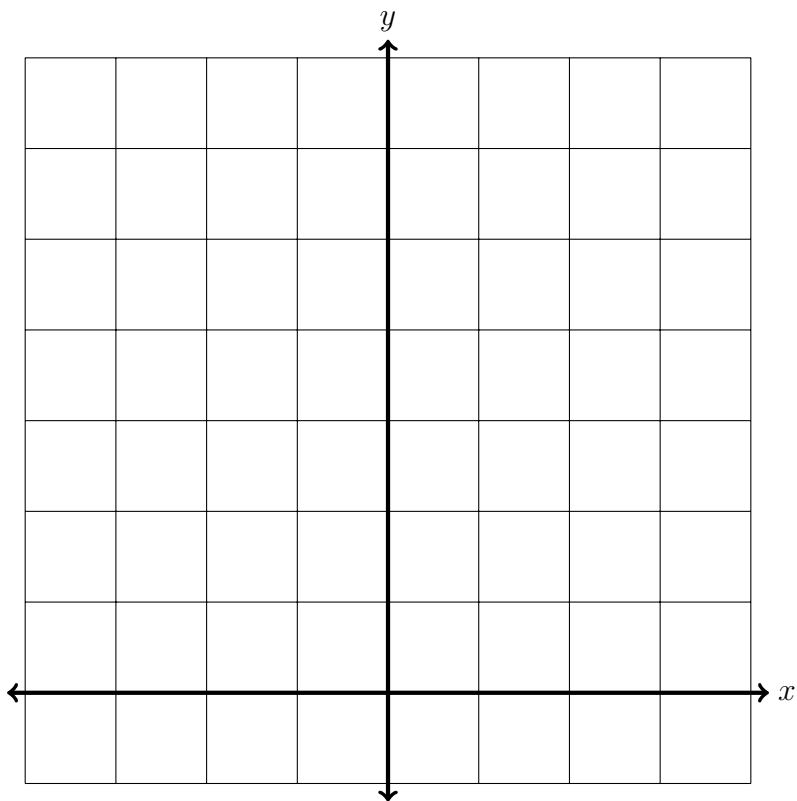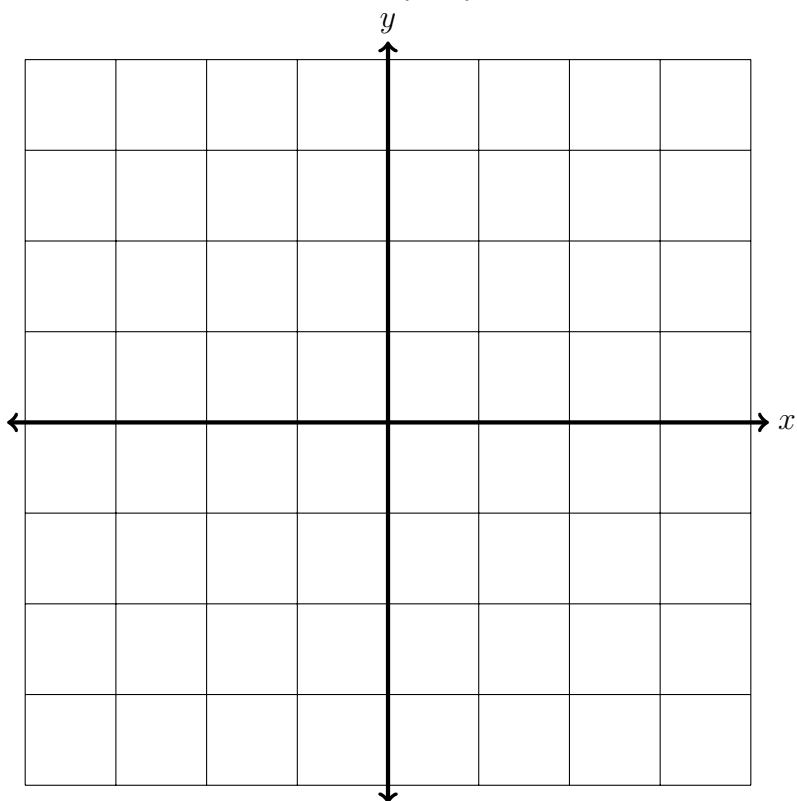
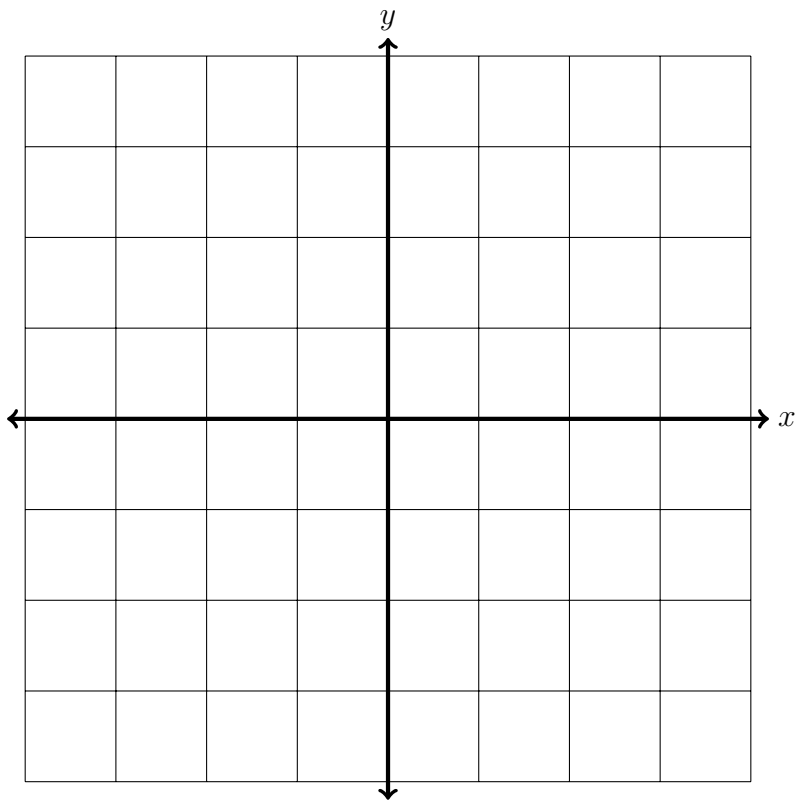(a) $g(x) = x^2$
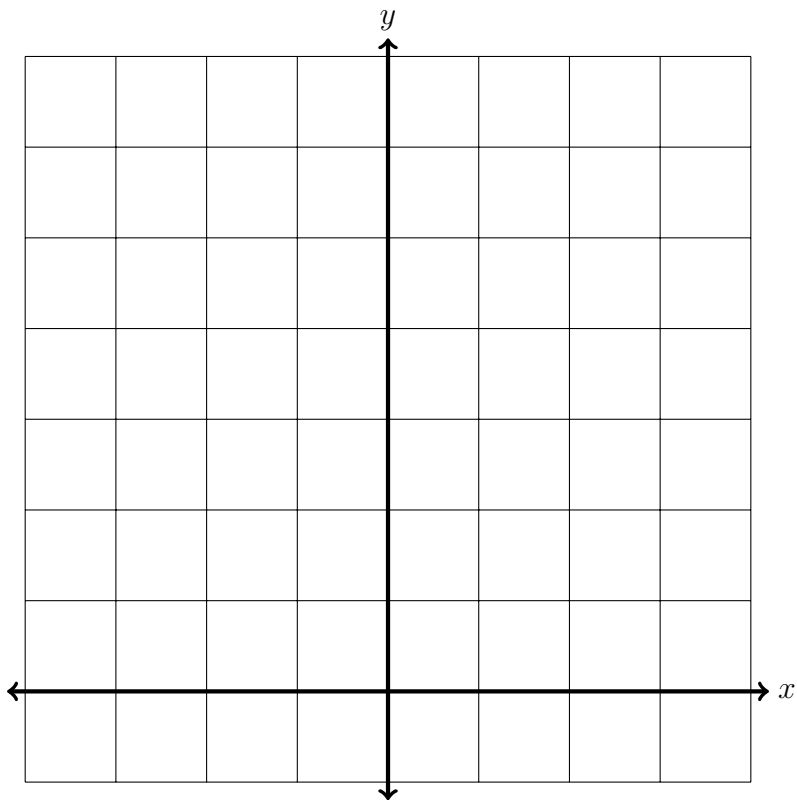
(b) $g(x) = \sqrt{x}$

(c) $h(x) = |x|$

(d) $F_1(x) = |x|$, $F_2(x) = -|x|$, and $F_3(x) = |x - 1|$ on the same plot.
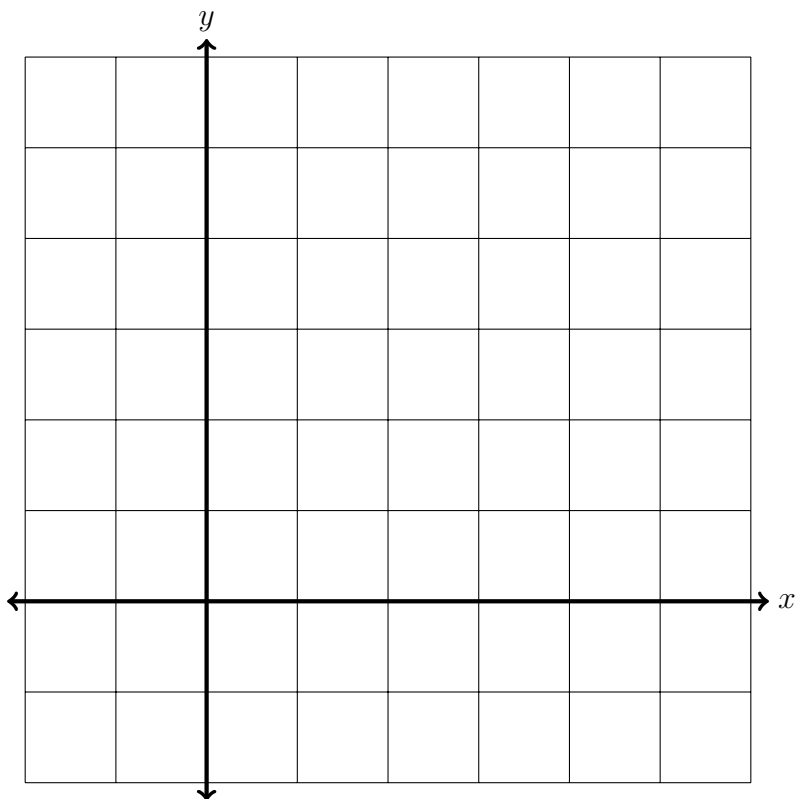Notice that F_2 and F_3 are shifts of F_1.

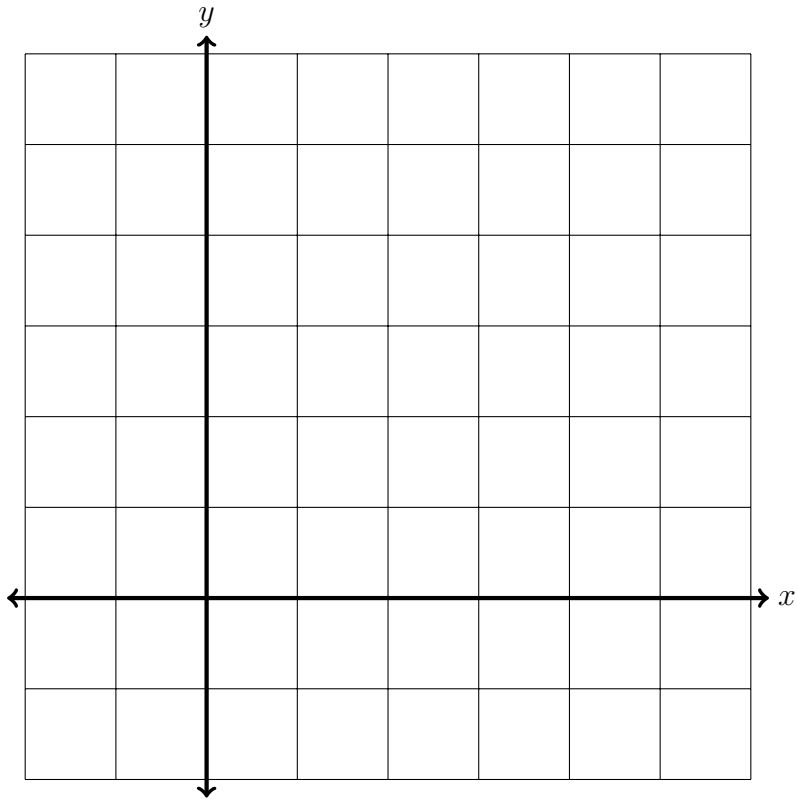3. Graph the following lines. (Solve for y if necessary.)

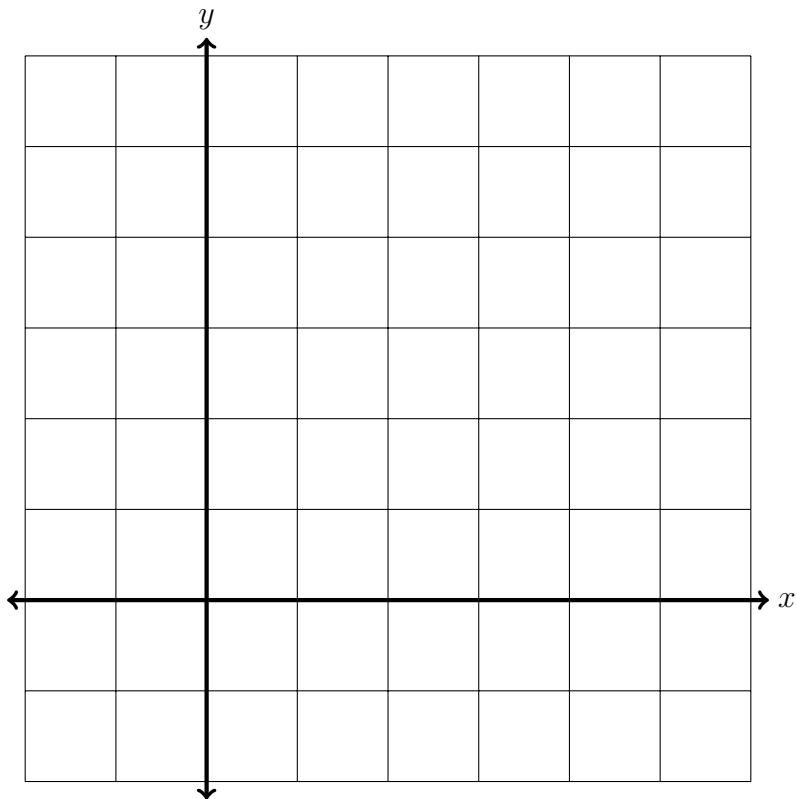(a) $y - 1 = -\dfrac{1}{2}(x + 2)$ *(point-slope form)*

(b) $3x + 4y = 12$ *(standard form)*
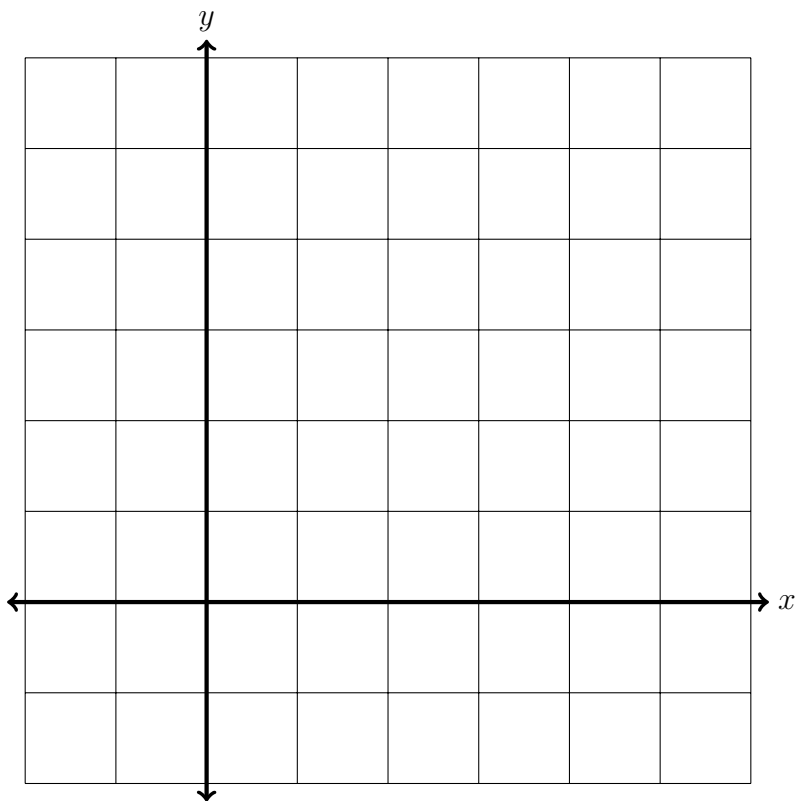
(c) $y = 2.5$ *(horizontal line)*

(d) $y = -\frac{5}{3}x + 4$ *(slope-intercept form)*

(e) $x = 1.8$ *(vertical line)*

4. In each part, find the equation of the line subject to the following conditions

   (a) The line contains the point $(0, 1)$ and is perpendicular to the line $y = \frac{2}{3}x - 100$.

   (b) The line crosses the origin and is parallel to the line $2y + 6x = 3.5$.

(c) *(Hard)* The line contains the point $(3, 4)$ and is perpendicular to the line $y = \dfrac{9}{19}$.

(d) *(Hard)* The line contains the point $(1, -3)$ and is perpendicular to the line $x = -7.26$.

5. Find the range and the domain of the following functions.

   (a) $f(x) = 2 + \sqrt{x - 1}$ *(Can you input 0? 5? −5? Can you get 3 as an output? −3?)*

(b) $g(x) = \dfrac{3}{x^2}$

(What can't you divide by? Is it possible to get 0 as an output? -1? 3?)

(c) $h(x) = \begin{cases} |x+1| & -2 \le x \le 1 \\ \sqrt{x-3} & x > 3 \end{cases}$

(Can you input -3? 0? 1? 3?) Can you get a negative output?

(d) $F(x) = -\dfrac{2}{7}x - \dfrac{11}{23}$.