Name_____

1. Suppose that $f(x) = x^2 + 3x$ and $g(x) = 1/x$. Evaluate each of the following, simplifying your answers as much as possible:

$$\text{e.g.} \quad f(r) = r^2 + 3r \quad or \quad = r(r+3)$$
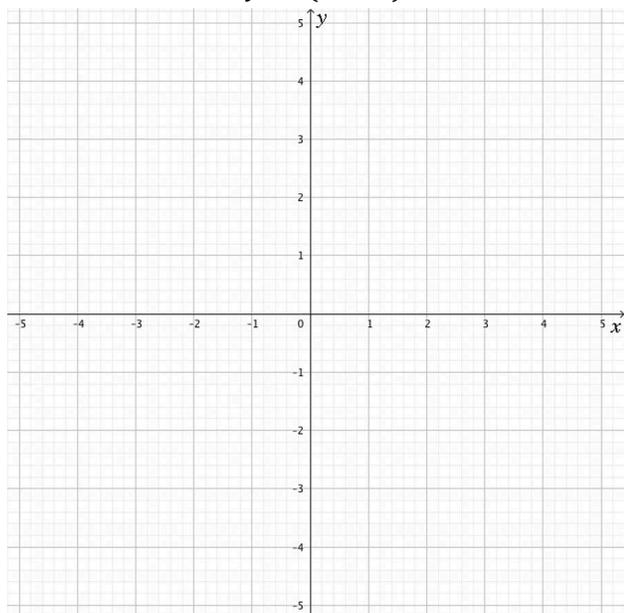
a. $f(a + b)$

b. $g\left(\frac{a}{b}\right)$
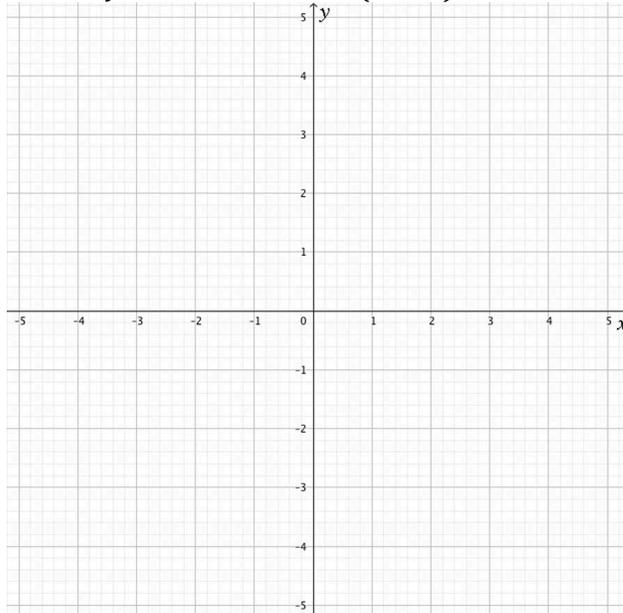
c. $\frac{f(a+b)-f(a)}{b}$

d. $\frac{g(a+b)-g(a)}{b}$

2. Sketch the following graphs AND sketch their "UR-functions" along with them. Indicate translation. Also find domain (possible x values) and range (possible y values).
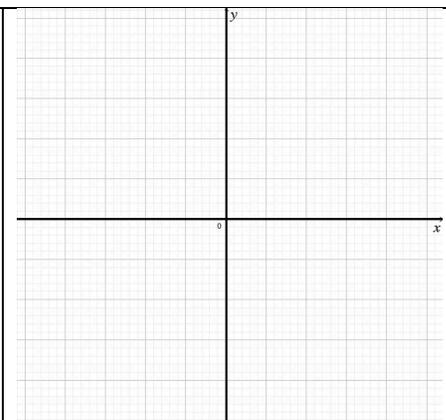
a. $y = (x - 1)^2 - 4$

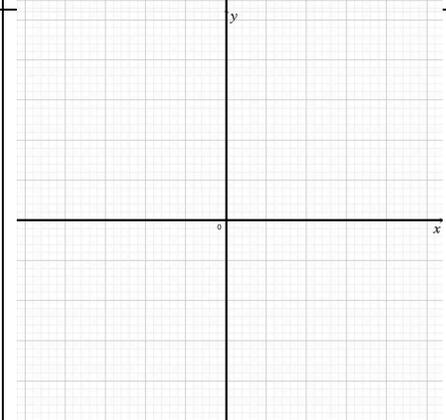b. $y = \sqrt{x - 3} - 2 = (x - 3)^{0.5} - 2$

3. Find the equations for the (straight) lines through the given points. Graph them and find both x and y intercepts.
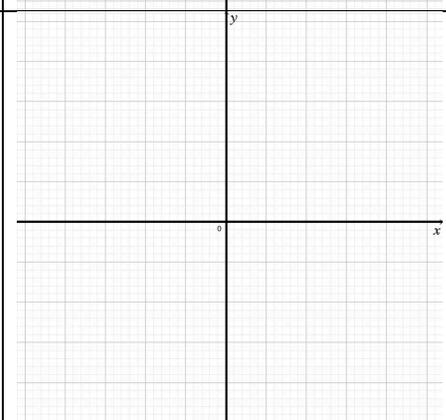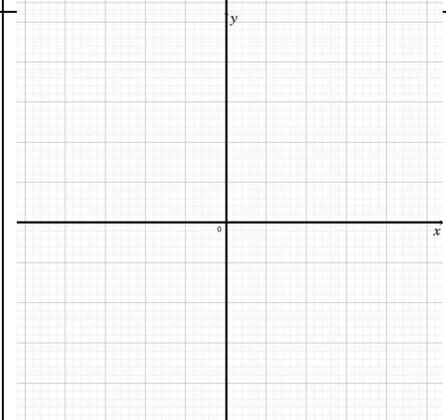
a. $(-1, -3)$ and $(1, 5)$

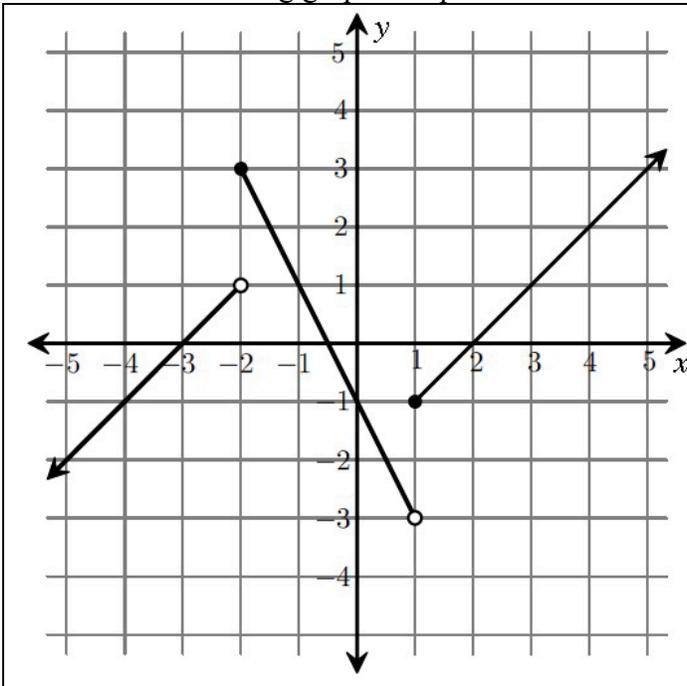b. $(-5, 8)$ and $(1, -4)$

c. $(1, 5)$ and $(3, 5)$

d. $(-1, 3)$ and $(1, 8)$

4. Suppose that *f* is a linear function and that *f(2) = 3* and *f(6) = 5*.
   a. Find *f(10)*.

   b. Find *a* such that *f(a) = 20*.

---

5. Consider the following graph of a piecewise function (assume that all indicated points are defined by integers):

a. Find the slopes and y-intercepts for each piece.

b. Write a piecewise expression for this function.

$$f(x) = \left\{ \right.$$

6. At 12:00:01 am, Sept. 1st, 2018, NASA sent Matt Damon to Mars.

   a. On Sept. 13th (12:00:01 am) he is 720,000 miles from earth. Assuming constant velocity, how far will he be from earth on Sept. 20th (12:00:01 am).

   b. If Mars is 55 million kilometers from earth, when will he get there? Present your answer in days, hours, minutes.

7. Water freezes at 0°C or 32°F. Water boils at 100°C or 212°F.
   a. Write a formula in y = mx + b form that will convert Celcius to Farenheit. In other words, input °C
      and output °F.   E.g. °F = f(°C) = m(°C) + b.
   b. Graph this conversion.
   c. Where are Farenheit and Celcius both the same number?