SEW Math 110 Homework 1 Due July 5th

1. Given $f(x) = 2x - x^2$, find the following. Be sure to simplify when possible.

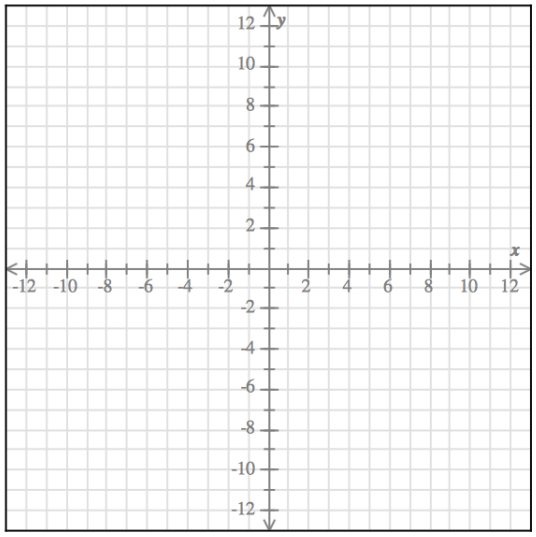
   a. $f(a)$

   b. $f(a+h)$

   c. The difference quotient $\dfrac{f(a+h) - f(a)}{h}$

2. A family of functions is given. Graph all the given members of the family on the same coordinate plane below (label each).

$$f(x) = c|x| \qquad\qquad c = 1, \frac{1}{2}, 2, -1, -\frac{1}{2}, -2$$



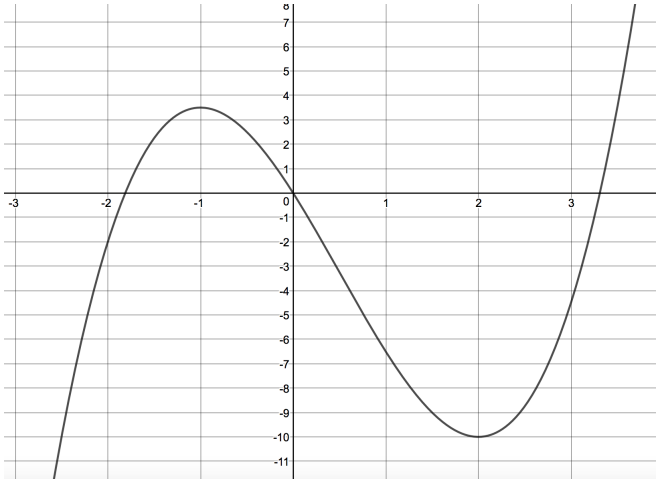
3. In a certain state, the minimum speed permitted on freeways is 40 $\frac{mi}{h}$, and the maximum speed permitted is 65 $\frac{mi}{h}$. The fine F for violating these limits is \$15 for every 1 $\frac{mi}{h}$ above the maximum OR below the minimum.

   a. Find a function for the fine $F(x)$, where x is the speed you are driving. Hint: don't forget to include speeds that are allowed (legal speeds) in your function, and the associated fine for those. Also, try some examples to help you formulate the function.

   b. Find $F(30)$, $F(50)$, and $F(75)$. Hint: make sure to plug these into your function from part (a) to check if it your function works and makes sense with the problem.

   c. Sketch a graph of your function for $30 \leq x \leq 75$. Be sure to label each axis of your coordinate plane appropriately.

- Use the given graph to answer the following.



a. State the domain and range of the function.

b. State the local minimum and maximum vales and at which x they occur. You can state these in point form.

c. State the intervals of increase and the intervals of decrease.

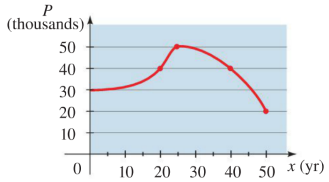
d. For what x values is $f(x) \leq 0$? You can estimate using decimals or fractions for x values that do not appear to be whole numbers.

- Given the function $h(t) = 2t^2 - t$, answer the following.

  a. Determine the net change from $t = 3$ to $t = 6$.

  b. Determine the average rate of change from $t = 3$ to $t = 6$.

- The graph shows the population P in a small industrial city from 1950 to 2000. The variable x represents the number of years since 1950. Use the graph to answer the following.



  a. What was the average rate of change of P between $x = 20$ and $x = 40$?

  b. Interpret the value that you found for the average rate of change from part a.