Name_____

BLC190- ATF-Fall 2019

Homework 1: Diagnostic Exercises

Don't be upset if you find some of these problems hard or even unsolvable. I'm challenging you with some difficult problems so that I can assess what areas of precalculus we should work on. Please write comments next to the problems you have trouble with so that I know where to focus my attentions.

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1. Suppose that $f(x) = x^3$ and $g(x) = \frac{1}{x+3}$. Evaluate each of the following, simplifying your answers as much as possible. Circle your answers. There is a pattern to the answers:

e.g.1: $f(x)+g(x) = x^3 + \frac{1}{x+3}$ *e.g. 2:* $f(w + t) = (w + t)^3$ *e.g.3:* $g(w+t) = \frac{1}{(w+t)+3}$

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a. $\frac{3[f(a+b)-f(a)]}{9a^2b+9ab^2+3b^3} =$

b. $\frac{g(a+b)-g(a)}{\left(\frac{-b}{2a^2+2ab+12a+6b+18}\right)} =$

c. $\frac{f\left(\sqrt[3]{3}\right)}{g(-2)} =$

Please don't use technology for the following.
The point is to figure it out in your mind. Feel free to check your results after the fact.

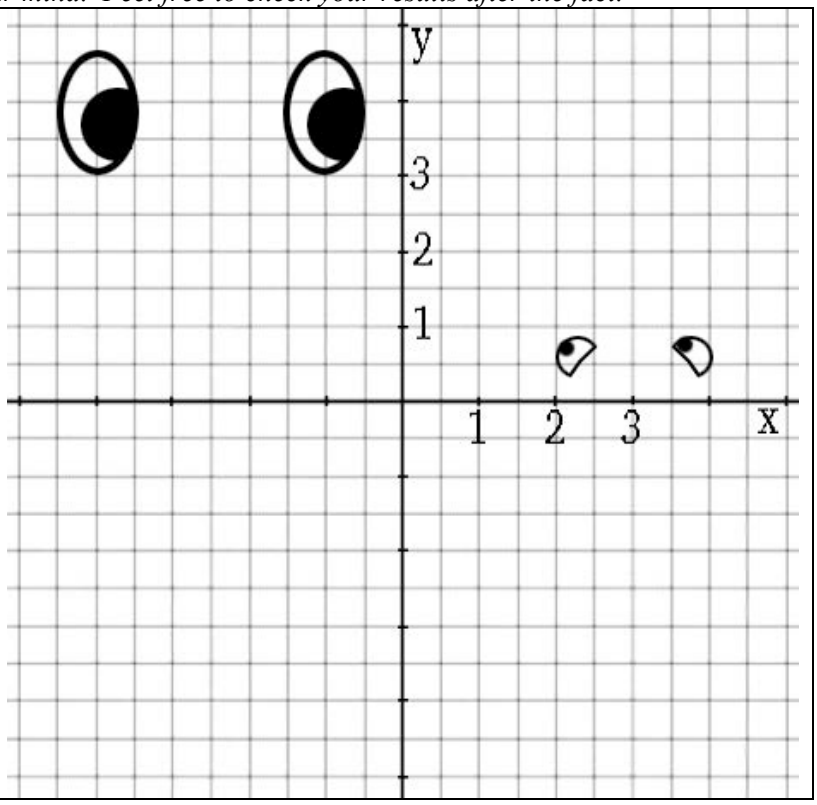
2. Sketch the graph of

$y = (x + 2.5)^2 - 4$ *for* $-5 \le x \le 0$

and

$y = -(x - 3)^2 + 1$ *for* $2 \le x \le 4$

Add any embelishments to the drawing/graph that you might want.

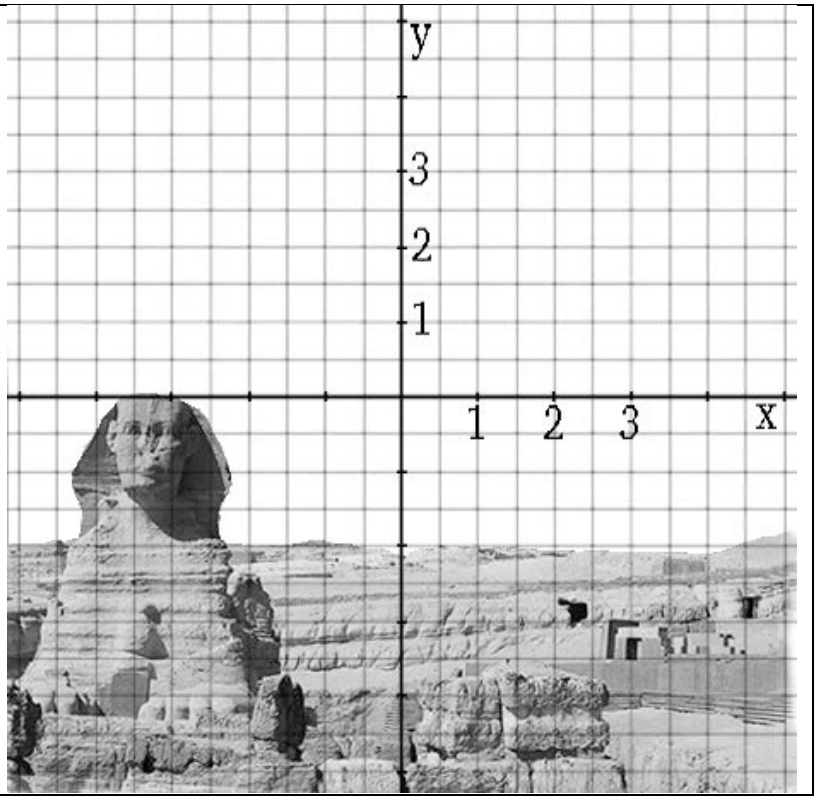


3.

$$y = -|x - 2| + \frac{5}{2}$$

$$from \quad -2.5 \le x \le 5$$

Then shade it in so that it looks nice.



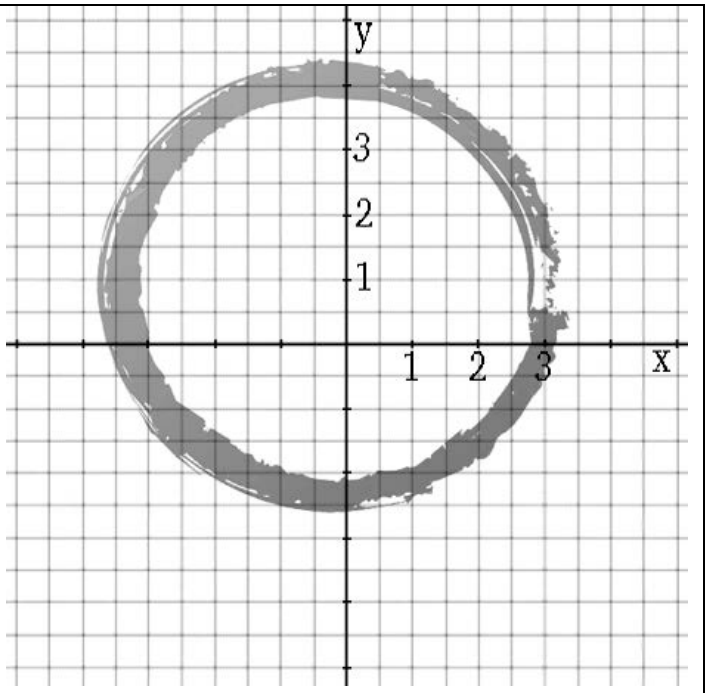
4. Find the equations for the (straight) lines through the points given. Graph them with a wide messy line similar to the circle shown on the graph. Then find both *x* and *y* intercepts. Circle all relevent answers.

a. (0, 3) and (1, 0)

For a, b, and c....
-find linear equation
-graph it with messy line
-find x and y intercepts.

b. (0, 3) and (–4, –3)

c. (–5, 2) and (0, 1)



5. Suppose that f is a <u>linear</u> function such that $f(5) = 9$ and $f(1) = -3$. Suggestion: Graph it first.

a. Find $f(7)$.

b. Find a such that $f(a) = 27$.

6. Consider the line $3x + 2y = 5$.

a. Find its slope.

b. Find its y-intercept.

c. Find its x-intercept.

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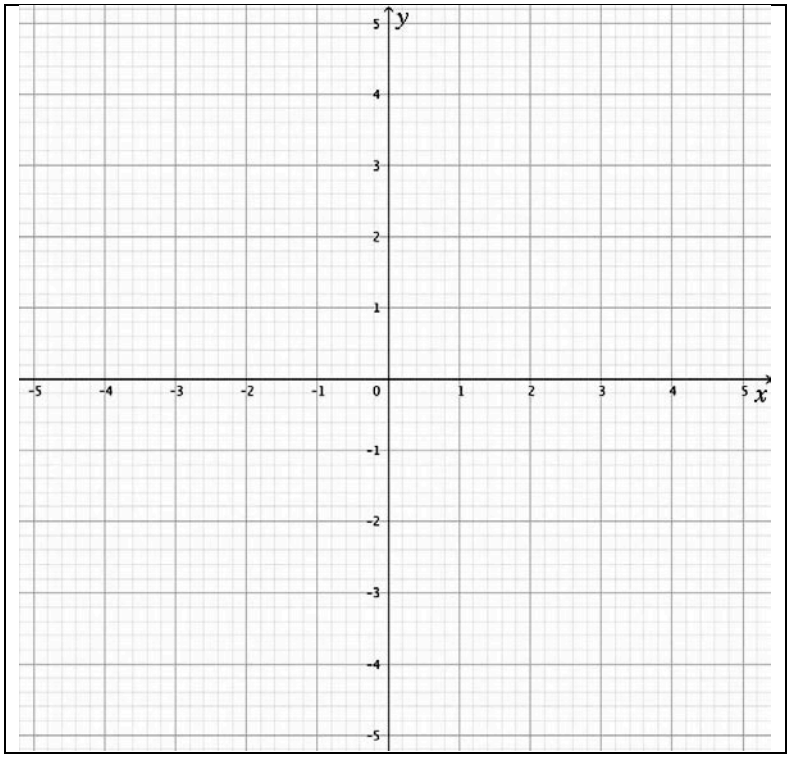
7. Write the **equations of 4 lines** which will intersect and make square.
One of the lines must be this one: ***y = 0.5x – 4***
Graph them all.



8. Starting at the age of 40 Benjamin Button's height shrinks at a rate of 2" per year. At age 40 he is exactly 68" tall. When will he disappear? Sketch a quick graph of his height as a function of age.

9. Family vacation in the minivan. You're family is not very organized and you got a very late start on your big trip. Everybody was on edge and not talking. You are sitting in the back seat. For the first hour of the trip you are aware that you are traveling at constant speed of 35mph. Then you fall asleep. When you wake up it is dark. You are disoriented.

"Where are we?" you ask.

"We've travelled 200 miles total and maintained a continuous speed of 55mph since you fell asleep," your mother responds with glee.

"What time is it?" you ask.

"Well. We left at 7:00 pm. You figure out what time it is!" your mother chides.

a. What time is it?

b. Graph the speed vs. time.

c. Write out the piecewise function.

$f(t) =$

10. 1 yard equals 3 feet. [1yd = 3'] Construct a conversion formula in the form y = mx + b, so that you can convert from one measurement to the other and then graph it. Hint: 0 yards = 0 feet.

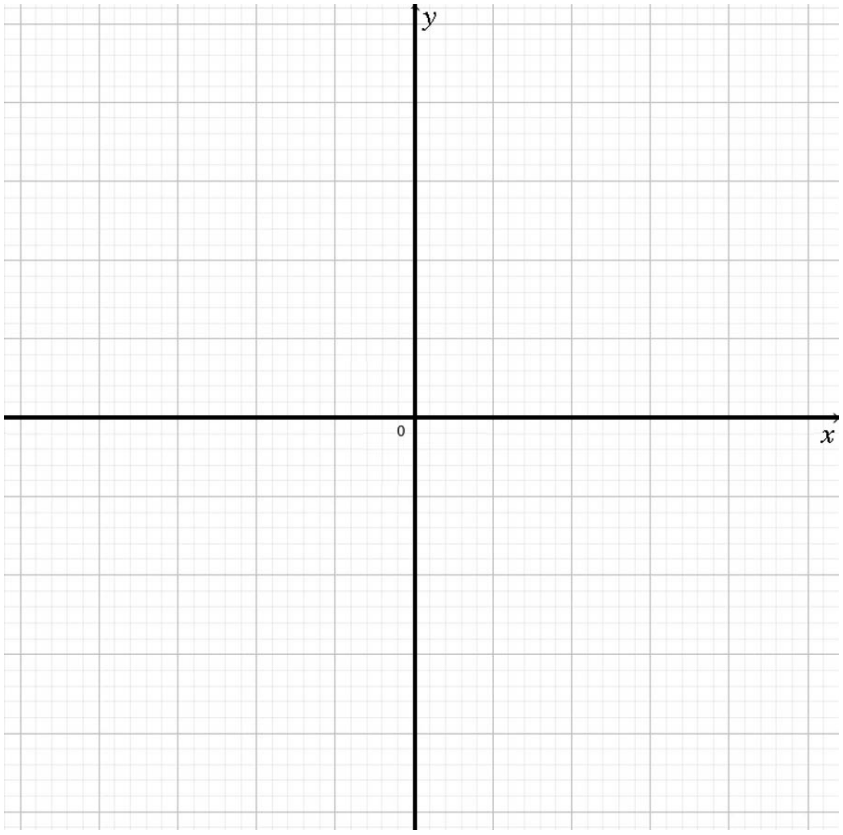
11. Water freezes at 0ºC or 32ºF. Water boils at 100ºC or 212ºF.

a. Write a formula in y = mx + b form that will convert Farenheit to Celcius. In other words, input ºF and output ºC.

E.g. ºC = *f*(ºF) = m(ºF) + b.

b. Graph this conversion equation.

c. Where do Farenheit and Celcius have the same numerical value?



12. Simplify $\frac{x^5(x^2y^4)^5}{x^{15}y^{20}}$.

13. Simplify $\frac{\left[\sqrt{(x^3y^4)}\right]^3}{(x^{3/2})^3(y^6)}$.

14. Solve for x. $3^x = 25$