1) We will start off by reviewing the concept of function.

a) What is your definition of ***function*****?**

b) What is your definition of the ***domain*** of a function?

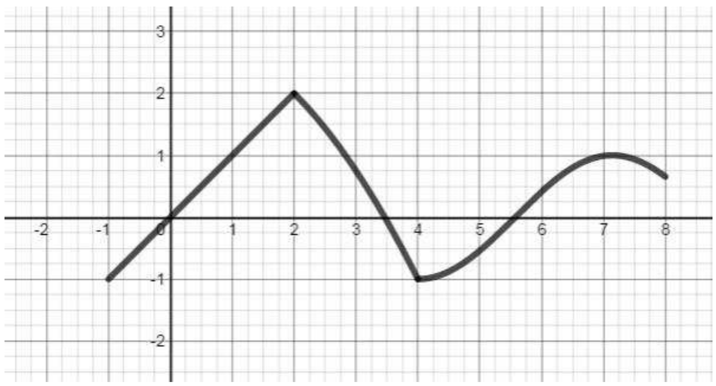
c) What is your definition of the ***range*** of a function?

d) What are some important features of a function that we can identify from its graph?

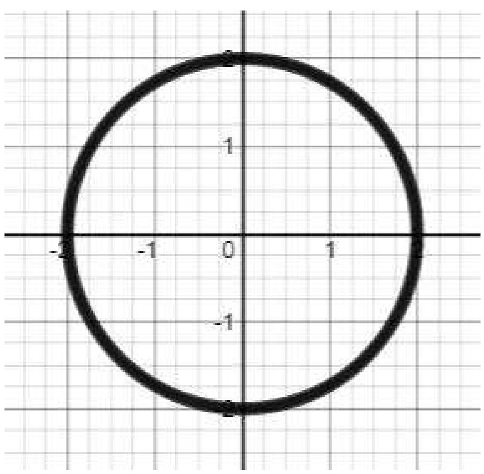
2) Using your definition of a *function*, or the definition decided on by the class, identify which of the following *relations* are functions, and explain why each is or is not. If the relation is a function, identify its domain and range.

a) $y = x^2$, where x is the input and y is the output

b)



c)



d)

x	$f(x)$
-5	3
-4	2
-3	3
-2	2
-1	3
0	2
1	3
2	2
3	3

e) Taking students in this class as the set of inputs, and outputting each student's birth mother.

3. A function that models the volume of a box is a polynomial given as $V(x) = x(8.5 - 2x)(11 - 2x)$.

   a. Often times when we encounter polynomials, they are in standard form, $a_n x^n + \ldots + a_1 x + a_0$. Give the formula for *V* from problem 1 in standard form.

   b. What is the degree of *V*? _______________

   c. What is the leading coefficient of *V*? _________________

4. The graph of *V* is given (label each axis, include units).

   a. On what interval(s) is *V* increasing?

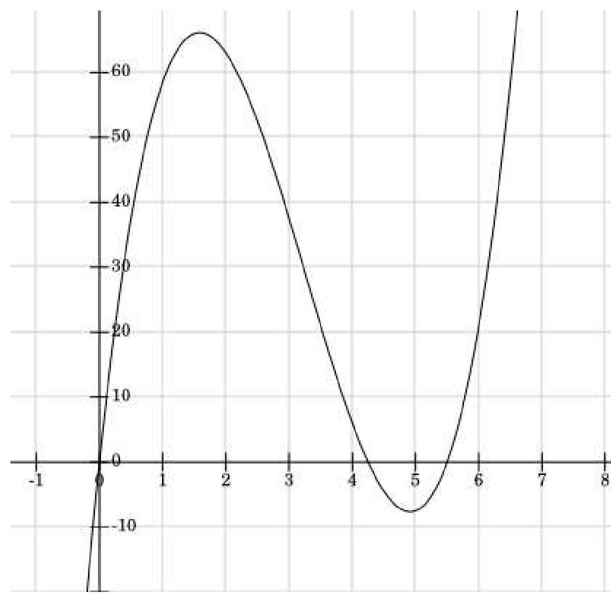
   ____

   b. On what interval(s) is *V* decreasing?

   ____

   c. Estimate any local maxima of *V*, and identify where those occur.

   d. Estimate any local minima of *V*, and identify where those occur.



5. Consider the rational function $f(x)=\dfrac{3x^2-3x-6}{2x^2-4x-16}=\dfrac{3(x-2)(x+1)}{2(x-4)(x+2)}$.

a. For what values of x will the numerator of $f(x)$ be zero?

b. For what values of x will the denominator of $f(x)$ be zero?

c. What is the domain of f?

d. Identify any vertical asymptotes of f.

e. Identify the *x* and *y* intercepts of the graph of f.

6. Now we will turn our attention towards horizontal asymptotes. Horizontal asymptotes can describe the end behavior of rational functions. Not all rational functions have a horizontal asymptote. Decide if each of the following has a horizontal asymptote or if it will blow up/down to +/- infinity. If the function has a horizontal asymptote, give its equation.

a. $f(x) = \dfrac{x+1}{3x^2+5x-2}$

Explain how to determine if a rational function has each of the following *when looking at its formula.*

- A horizontal asymptote of *y* = 0.

- A horizontal asymptote other than *y* = 0.

- No horizontal asymptote.

b. $g(t) = \dfrac{3t^2+5t-2}{t+1}$

c. $h(x) = \dfrac{5x^3-3x^2+1}{2x^3+4}$

7. The formulas for two exponential functions are given below.

$$f(x) = 8\left(\frac{1}{2}\right)^x \qquad\qquad g(x) = 2 \cdot 3^x$$

a. Determine each of the following:

$f(1) =$ $\qquad$ $g(0) =$ $\qquad$ $f(-2) =$ $\qquad$ $g\left(\frac{1}{2}\right) =$

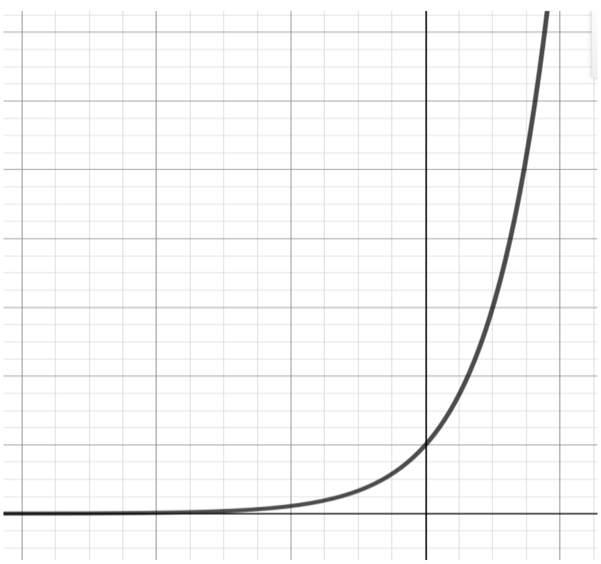
b. What is the domain of *f*? What is the domain of *g*?

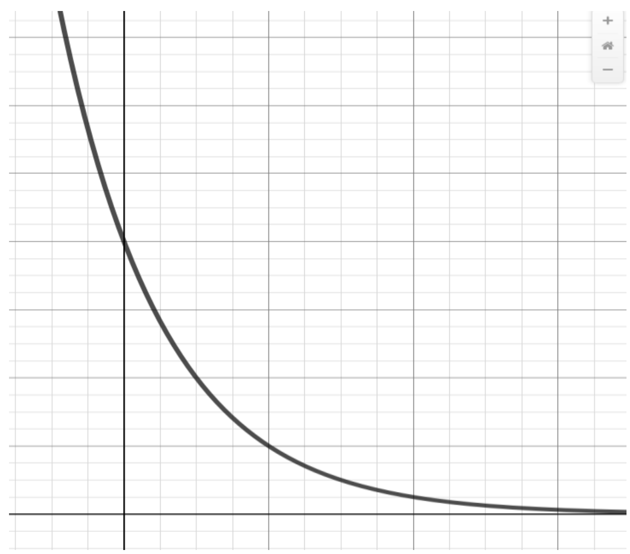
c. Complete the tables below by looking for a pattern in the given values. (Try **not** to use your calculator.)

x	-4	-3	-2	-1	0	1	2	3	4
$f(x) = 8\left(\frac{1}{2}\right)^x$	128			16	8	4			$\frac{1}{2}$

x	-4	-3	-2	-1	0	1	2	3	4
$g(x) = 2 \cdot 3^x$	$\frac{2}{81}$			$\frac{2}{3}$	2	6			162

d. Use the tables of values above to label the graphs below as f or g.





e. Label the y-intercept on each of the graphs. How is the y-intercept related to the function formula?

8) Use positive rational exponents to rewrite each of the following without any radical symbols.

Rules of Exponents:

$b^{1/n} = \sqrt[n]{b}$

$b^{m/n} = \left(b^m\right)^{1/n} = \sqrt[n]{b^m}$

$b^{m/n} = \left(b^{1/n}\right)^m = \left(\sqrt[n]{b}\right)^m$

$\left(b^r\right)^p = b^{r \cdot p}$

$b^{-r} = \dfrac{1}{b^r}, \quad b^{-1} = \dfrac{1}{b}$

$b^r \cdot b^p = b^{r+p}$

$\dfrac{b^r}{b^p} = b^{r-p}$

$b^0 = 1$

a. $\sqrt[3]{16x^{12}}$

b. $\sqrt[7]{t^5}$

c. $\left(\sqrt[7]{t}\right)^5$

d. $\left(\sqrt[3]{y^2}\right)^{-5}$ for $y \neq 0$

e. Explain why we have in (d) that we have $y \neq 0$

9) a) Determine the domain of $g(t) = \left(-3t-6\right)^{5/2}$ (HINT: First write *g(t)* in radical notation)

b) Solve the equation $\left(-3t-6\right)^{5/2} = 32$

Trigonometric Functions Definitions: Let $P(x, y)$ be a point on a circle of radius r associated with the angle θ.

$\sin(\theta) =$ $\cos(\theta) =$ $\tan(\theta) =$

$\csc(\theta) =$ $\sec(\theta) =$ $\cot(\theta) =$