Review of functions

Use the textbook/ notes at http://tutorial.math.lamar.edu/Classes/Alg/FunctionDefn.aspx or notes at http://mathstat.fiu.edu/useful-information/math-resources/pre-calculus-algebra/chapter-3-notes.pdf *to review the concept of a function and its properties that you studied in College Algebra. It is assumed that you are familiar with these concepts.*

1. Give the definition of a function from a set X to a set Y. Define the domain and the range.

In this course we will study only functions for which the domain and the range are sets of real numbers.

2. What are the two main ways to define a function from a set of real numbers to a set of real numbers?

3. If *f* is a function (from a set of real numbers to a set of real numbers), explain what the symbol *f(x)* stands for.

4. Given function $f(x) = -2x^2 + 4x - 1$, find and simplify the following

a) f(2)
b) f(-1)
c) f(0)
d) f(-x)
e) f(x + 1)
f) f(x+h)
g) f(2x)

5. Find the domain of the given function. Start by writing the condition(s) x must satisfy. Write your answer in the **interval notation** and **the set builder notation** *(please recall interval notation and set builder notation, if you've forgotten what this means see for example http://www.coolmath.com/algebra/07-solving-inequalities/02-set-builder-notation-01)*

a) $f(x) = \sqrt{4-2x}$

b) $f(x) = \dfrac{5x-8}{\sqrt{2x+3}-2}$

c) $f(x) = \dfrac{2}{x^2+2x-1}$ *(in this example you will have to solve a quadratic equation, to review the ways of solving such equations see http://tutorial.math.lamar.edu/Classes/Alg/SolveQuadraticEqnsI.aspx)*

6. Recall that **the difference quotient** for a function f is an expression $\dfrac{f(x+h)-f(x)}{h}$. Find the difference quotient for

a) $f(x) = -x^2 - 3x + 5$

(recall that $(a+b)^2 = a^2+2ab+b^2$ and $(a-b)^2 = a^2-2ab+b^2$)

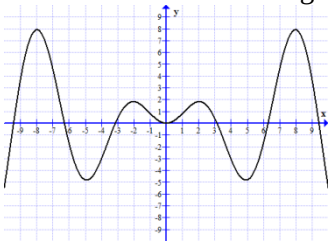
b) $f(x) = \dfrac{3}{2x-1}$

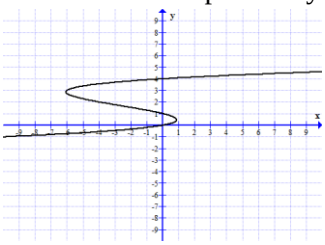
(Recall how we add/subtract rational equations at http://tutorial.math.lamar.edu/Classes/Alg/RationalExpressions.aspx)

7. If $f(x) = \dfrac{2x-A}{3x+4}$ and *f(1) =7*, what is the value of A?

8. Give the definition of the graph of a function. How do we know that a graph in xy-plane represents a function. State the corresponding theorem (the Vertical Line Test).

9. Determine whether each graph represents a function. Explain why or why not.





10. Define x and y- intercepts of a function. How do we find them? *(See http://mathstat.fiu.edu/useful-information/math-resources/pre-calculus-algebra/chapter-3-notes.pdf)*

11. Find the intercepts of the following functions

a) $f(x) = x^2 + x - 1$

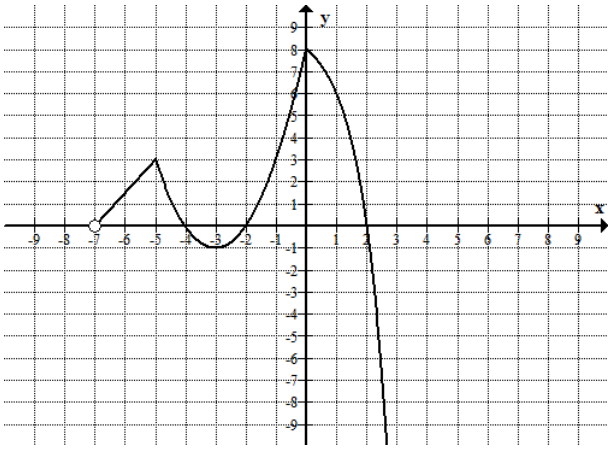
b) $f(x) = \dfrac{x^2 - 3}{\sqrt{2x+3}}$

(You will have to solve some quadratic equations here- make sure to review the methods of solving quadratic equations!)

12. Give the definition of an odd function and an even function. Draw the graph of an even function. Draw the graph of an odd function. *(to recall these concepts see http://mathstat.fiu.edu/useful-information/math-resources/pre-calculus-algebra/chapter-3-notes.pdf)*

13. Determine whether the function $f(x) = \dfrac{x}{2x^2+3}$ is even, odd or neither. If it is even or odd, explain what this information tells us about the graph of this function.

14. The graph of a function f(x) is given below. Answer the questions that follow.

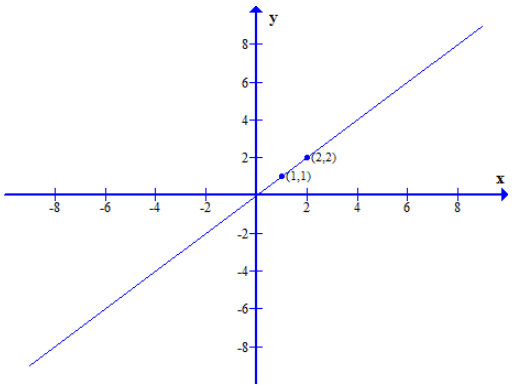


a) What is the domain of f(x)?
b) What is the range of f(x)?
c) What are the x-intercepts, if any?
d) What is the y-intercept, if any?
e) Give the definition of an increasing function. List the intervals on which the given function is increasing.
f) Give the definition of a decreasing function. List the intervals on which the given function is decreasing.
g) For what values of x is $f(x) > 0$? Write the answer in the interval notation.
h) For what values of x is $f(x) \leq 0$? Write the answer in the interval notation.

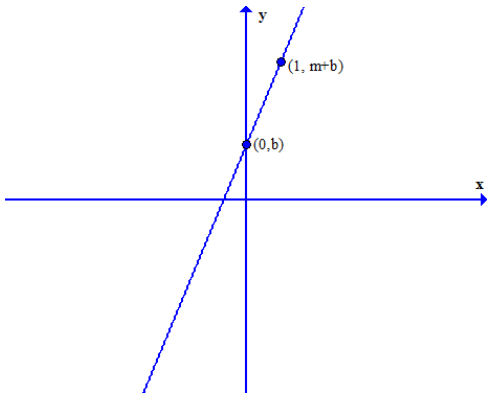
i) Is this an odd function? Explain why or why not.
j) Find the following values: f(2), f(-5), f(0), f(1)

Here are the graphs of the basic functions. We will assume that you are familiar with these functions which means we will expect you to recognize each of them and draw (accurately!) their graphs.

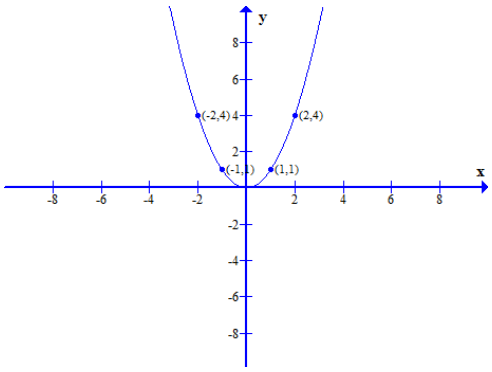
f(x) = x identity function



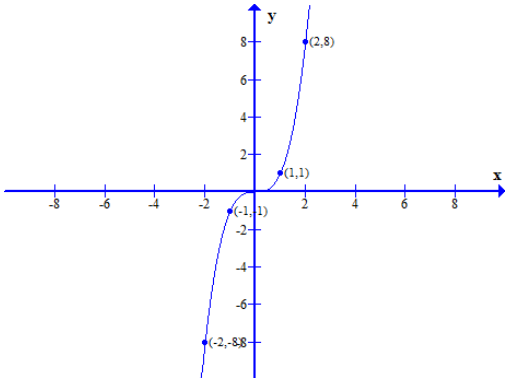
f(x) = mx +b linear function



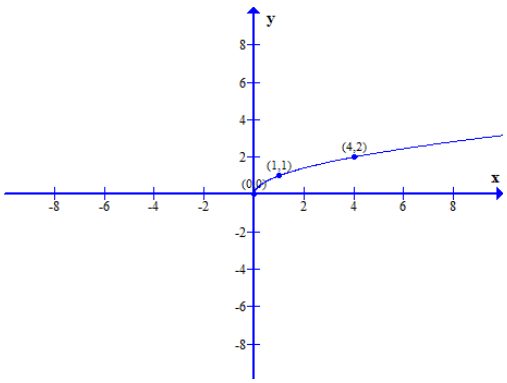
f(x) = x^2 square function



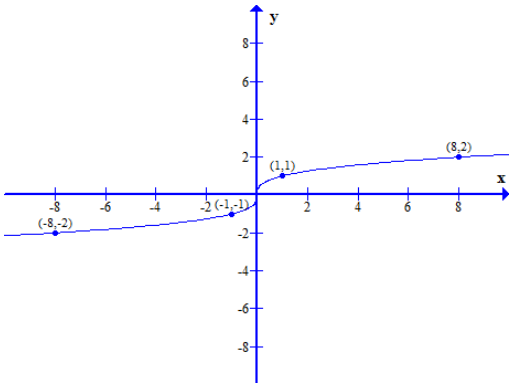
f(x) = x^3 cube function



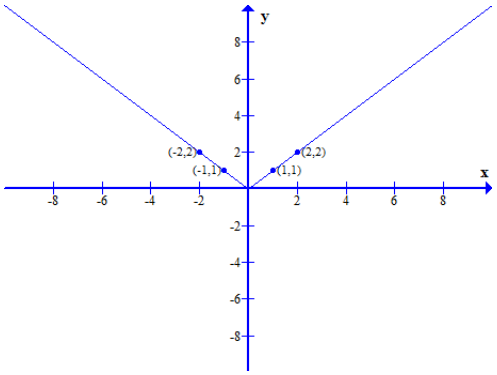
f(x) = $\sqrt{x}$ square root function



f(x) = $\sqrt[3]{x}$ cube root function



f(x) =|x| absolute value function



15. State the definition of a piecewise function.

16. For the given function, find f(-3), f(-1), f(0), f(2), f(5)

$$f(x)=\begin{cases}|x+1| & \text{for } x<-1\\ \sqrt[3]{x} & \text{for } -1\le x\le 3\\ \dfrac{1}{x-3} & \text{for } x>3\end{cases}$$

17. Graph the following piecewise functions

a) $f(x)=\begin{cases}3x-4 & \text{for } x\le 1\\ x^2 & \text{for } x>1\end{cases}$

b) $f(x)=\begin{cases}-3 & \text{for } x\le -2\\ |x| & \text{for } -2<x<4\\ \sqrt{x} & \text{for } x\ge 4\end{cases}$