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Intro to Calculus

Lesson for HW 5[1]

Goals

I can:

- Find the composition of two functions.
- Create function to represent a situation involving area, perimeter, or volume.
- Use interval notation to describe the domain and range of a function (which may or may not be continuous) given its graph.
- Translate function notation into values on a graph.
- Identify expressions involving a function as distances on a graph of the function, and vice versa.
- Determine if the graph of a function is symmetric about the x-axis, y-axis, or origin.
- Find the location of points on a graph in terms of given distance from the origin.
- Determine if a function is odd or even using graphs or algebra.

Warm-Up

1. What has to be true about what you put into an absolute value function so that it comes out as the same thing as went in?

2. Apply the above idea to solving the following:

   a. $|x| = x$

   b. $|x-4| = x-4$

3. What is a simpler form of $\sqrt[8]{x^8}$?

4. Apply the idea above to the following:

   a. $\sqrt[4]{(x-2)^4} = 8$

   b. $\sqrt{x^2+4x+16} = 12$

5. Re-write the following using fractional exponents. Simplify.

   a. $\sqrt{\frac{\sqrt{2}}{2}}$

   b. $\frac{\sqrt{2\sqrt[4]{2}}}{2}$

[1] This work extensively borrows from work of Prof. Scott Farrand, CSU Sacramento

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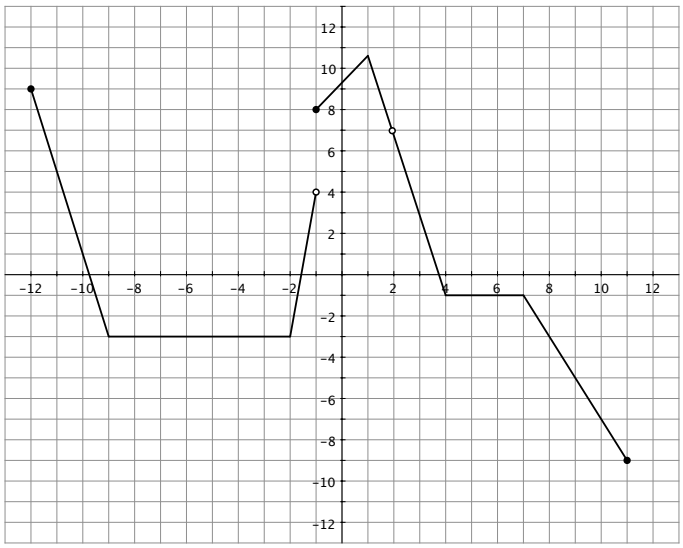
6. Which of the following statements is true?

   a. A function can have two different x-values for a given y-value.

   b. A function can have two different y-values for a given x-value.

7. Does the equation $(y+x)^2 - 4x = y^2$ define a function of x?

Lesson for Homework 5
Part 1: Using a graph to evaluate functions.



1. What is the domain and range of f(x)?

2. Find the numerical values for the following. Approximate where necessary.

   a. f(1) b. f(2) c. f(-1)

3. Draw a segment whose length is $f(-11)$.

4. Find the value(s) of x which make the following true. Approximate where necessary.

   a. $f(x) = 0$ b. $f(x) = 2$

   c. $f(x) = f(-x)$ d. $f(x) = -f(-x)$

   e. $-f(x) = f(-x)$

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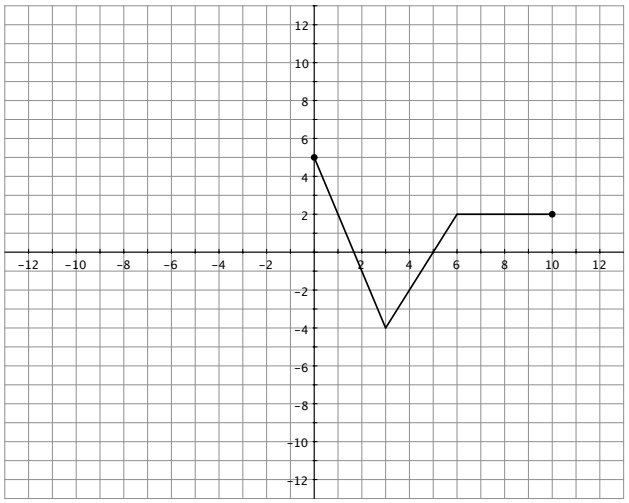
Part 2- Symmetry of Functions
Reflecting Across the y-axis



a. List the locations of at least three points on the graph. Plot these points on the graph.

b. Reflect the graph across the y-axis.

c. Locate the points on the reflection which correspond to the three points you drew previously. What are their coordinates?

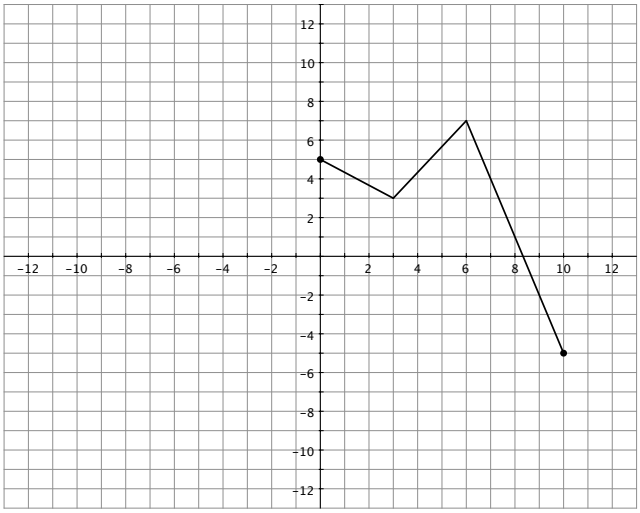
d. In general, what happens to the coordinates of points as the result of reflecting a graph across the *y*-axis?

e. Find locations on the whole graph (original and reflection) where $f(x) = f(-x)$.

f. What does it mean for a function to be even?

Reflecting a reflection.

a. List the locations of at least three points on the graph. Plot these points on the graph.



b. Reflect the graph across the y-axis and then across the x-axis.

c. Locate the points on the reflection which correspond to the three points you drew previously. What are their coordinates?

d. In general, what happens to the coordinates of points as the result of reflecting a graph across the y-axis and then across the x-axis?

e. Find locations on the whole graph (original and reflection) where $f(x) = -f(-x)$.

f. What does it mean for a function to be odd?

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Determining symmetry from equations.

1. What has to be true about the the graph of a function in order for it to be even?

2. What has to be true about the values of a function in order for it to be even?

3. How could we use your answers to the questions above to test to see if a function is even when given the equation of the function— without making a graph?

4. Show that your test results in the function $f(x) = 3x^4 - 6x^2$ being even.

5. What has to be true about the graph of a function in order for it to be odd?

6. What has to be true about the values of a function in order for it to be odd?

7. How could we use your answers to the questions above to test to see if a function is odd when given the equation of the function— without making a graph?

8. Show that your test results in the function $g(x) = x\sqrt{1-x^2}$ being odd.

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9. Determine algebraically if the following functions are even, odd, or neither. Verify with your grapher.

   a. $f(x) = 12x^4$

   b. $g(x) = 3x^3 + 5$

   c. $k(t) = \dfrac{t^6 + t^5}{t - 1}$

   d. $k(x) = |x| - x^3$