Lesson 17: Four Interesting Transformations of Functions

Classwork

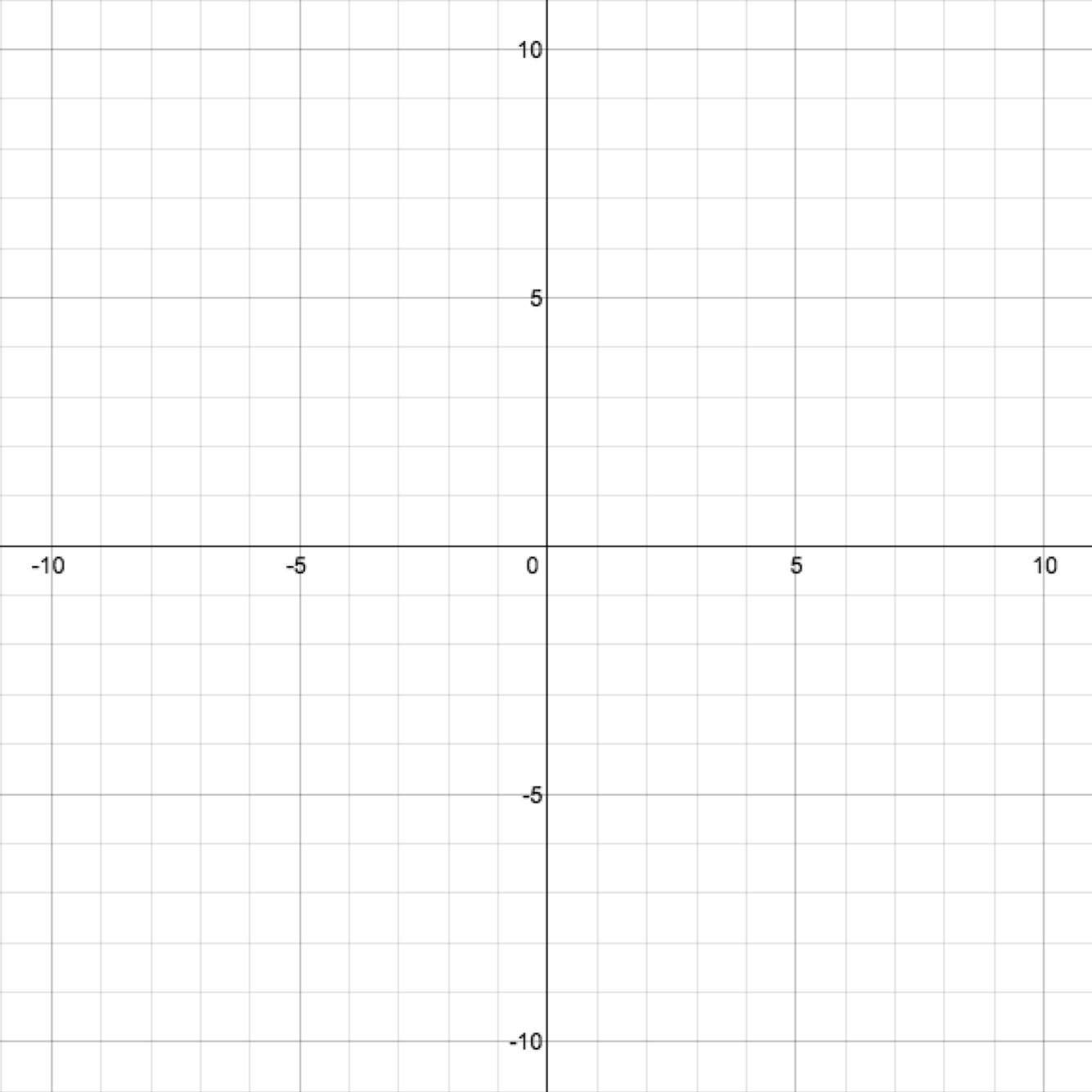
**Exploratory Challenge 1**

Let , , and for any real number .

* 1. Write an explicit formula for in terms of (i.e., without using notation).
  2. Write an explicit formula for in terms of (i.e., without using notation).
  3. Complete the table of values for these functions.

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* 1. Graph all three equations: , , and .



* 1. What is the relationship between the graph of and the graph of ?
  2. How dothe values of and relate to the values of ?

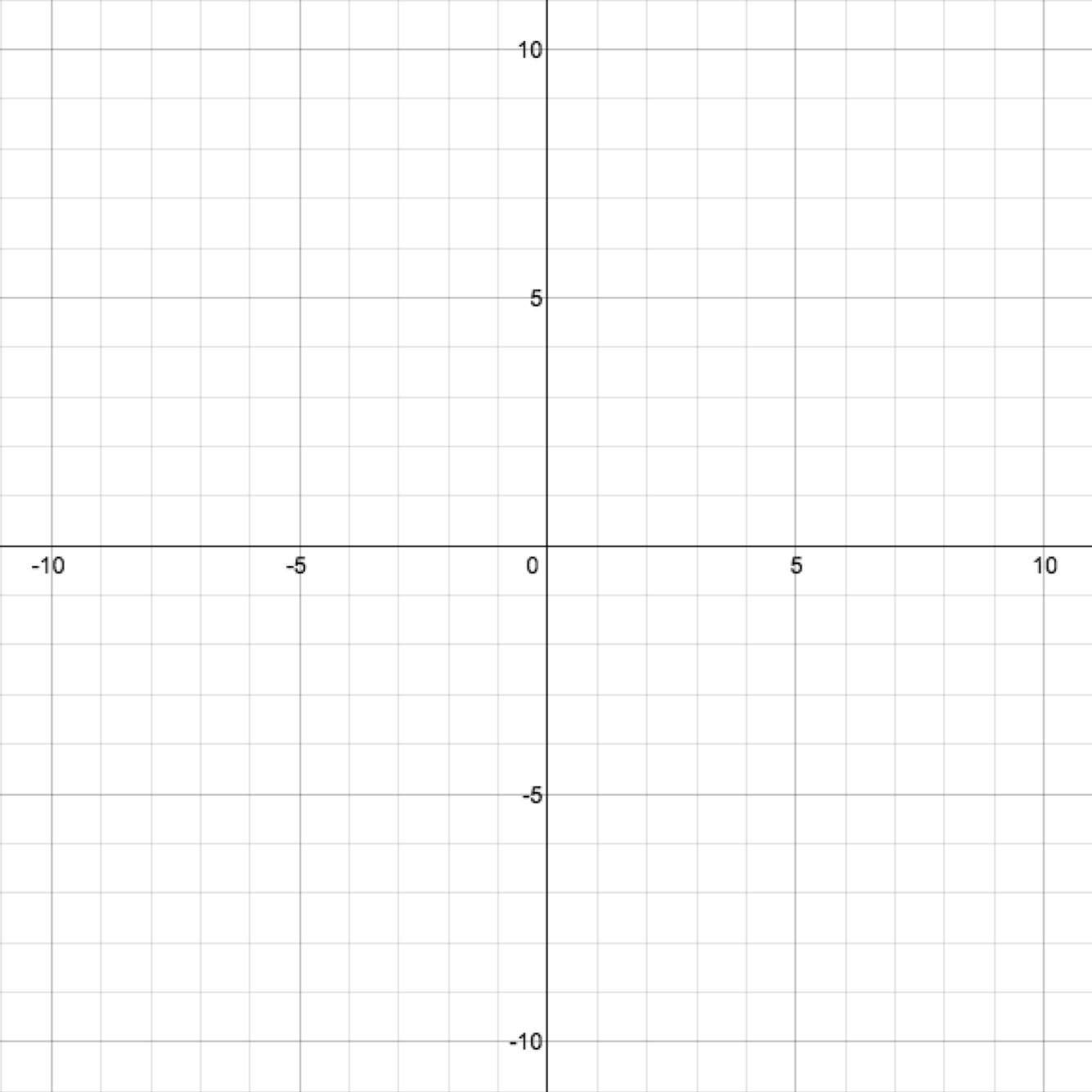
**Exploratory Challenge 2**

Let , , and for any real number .

* 1. Write a formula for in terms of (i.e., without using notation).
  2. Write a formula for in terms of (i.e., without using notation).
  3. Complete the table of values for these functions**.**

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* 1. Graph all three equations: , , and **.**



Given , let , , and for any real number .

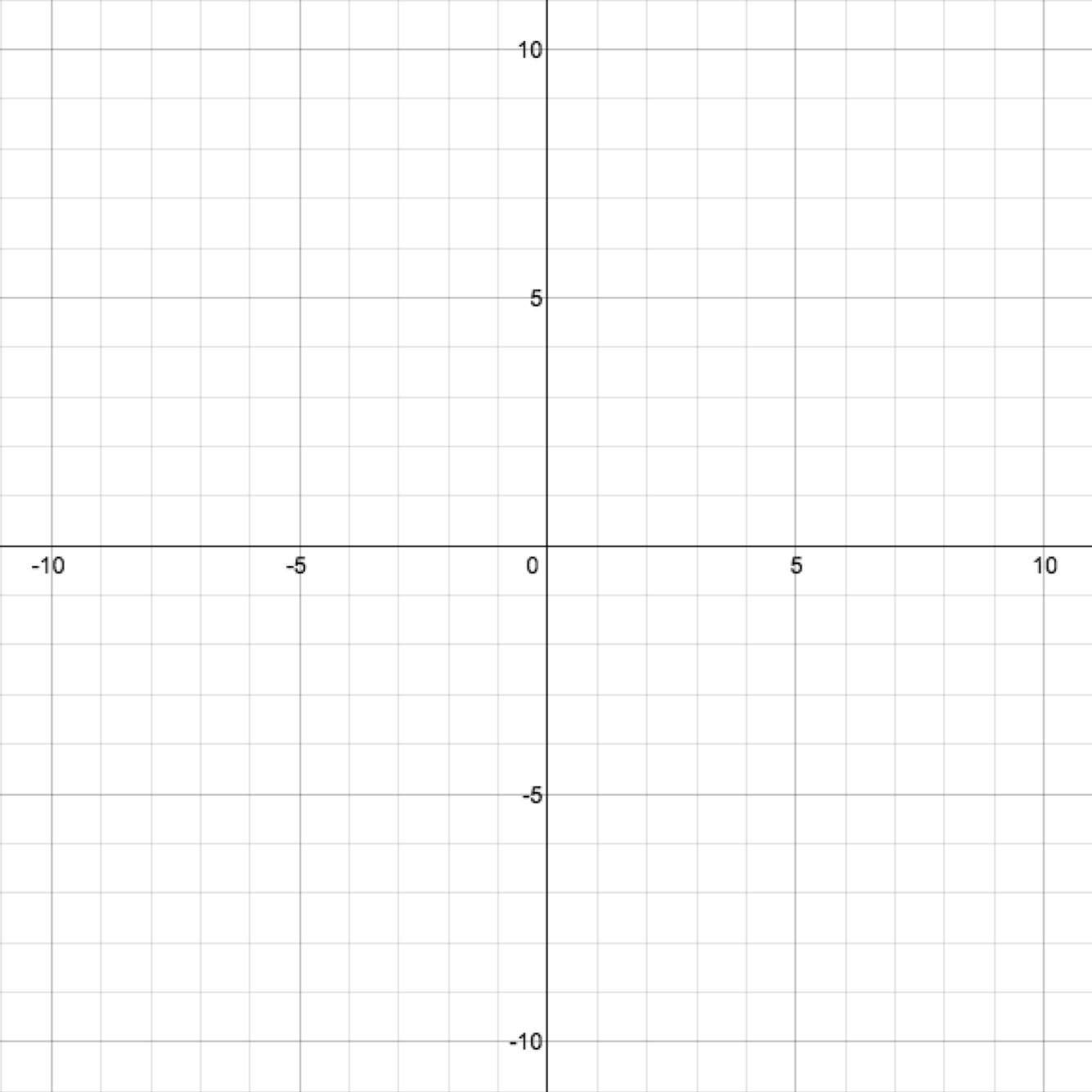
* 1. Write the formula for in terms of (i.e., without using notation).
  2. Write the formula for in terms of (i.e., without using notation).
  3. Complete the table of values for the functions , , and .

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* 1. Graph all three functionson the same graph that was created in part (d). Label the graphs as ,, and .
  2. How is the graph of related to the graph of when ?
  3. How is the graph of related to the graph of when ?
  4. How do the values of functions ,, and relate to the values of functions , , and , respectively?   
     What transformation of the graphs of , , and represents this relationship?

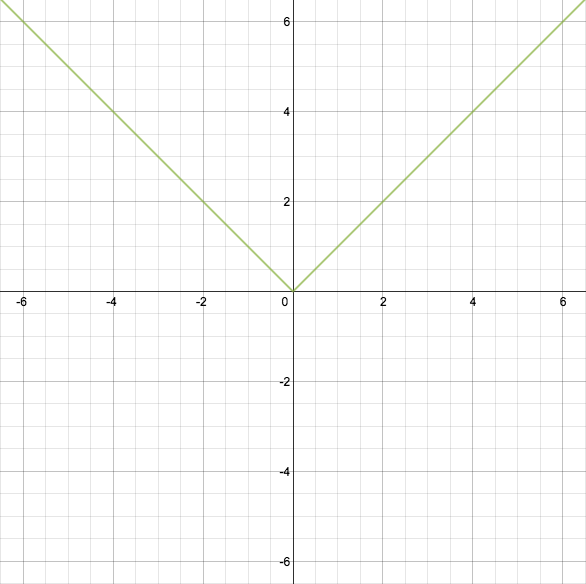
Exercise

Make up your own function by drawing the graph of it on the Cartesian plane below. Label it as the graph of the equation . If and for every real number , graph the equations and on the same Cartesian plane.

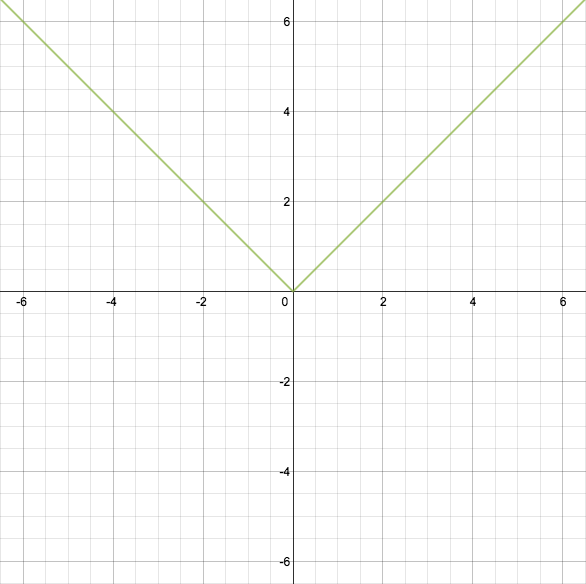


Problem Set

Let for every real number . The graph of is shown below. Describe how the graph for each function below is a transformation of the graph of . Then, use this same set of axes to graph each function for Problems 1–5. Be sure to label each function on your graph (by , *,* etc.).

1. 
3. Let and for every real number . The graph of is shown below.   
   Complete the table below to generate output values for the function , and then graph the equation on the same set of axes as the graph of .

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1. Let for every real number . Let and be functions found by transforming the graph of .   
   Use the graphs of ,, and below to write the functions and in terms of the function . (Hint: What is the ?)

