Function Homework – Sample Test: Function I[*]

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Abstract

This module provides a sample test on functions.

Exercise 1

Chris is $1\frac{1}{2}$ years younger than his brother David. Let D represent David's age, and C represent Chris's age.

  a. If Chris is fifteen years old, how old is David?_ _ _ _ _ _
  b. Write a function to show how to find David's age, given Chris's age. $D\left(C\right) =$_ _ _ _ _ _

Exercise 2

Sally slips into a broom closet, waves her magic wand, and emerges as...the candy bar fairy! Flying through the window of the classroom, she gives every student two candy bars. Then five candy bars float through the air and land on the teacher's desk. And, as quickly as she appeared, Sally is gone to do more good in the world.

Let s represent the number of students in the class, and c represent the total number of candy bars distributed. Two for each student, and five for the teacher.

  a. Write a function to show how many candy bars Sally gave out, as a function of the number of students. $c\left(s\right) =$_ _ _ _ _ _
  b. Use that function to answer the question: if there were 20 students in the classroom, how many candy bars were distributed? **First represent the question in functional notation—then answer it.** _ _ _ _ _ _
  c. Now use the same function to answer the question: if Sally distributed 35 candy bars, how many students were in the class? **First represent the question in functional notation—then answer it.** _ _ _ _ _ _

Exercise 3

The function $f\left(x\right) =$ is "Subtract three, then take the square root."

  a. Express this function algebraically, instead of in words: $f\left(x\right) =$_ _ _ _ _ _
  b. Give any three points that could be generated by this function:_ _ _ _ _ _
  c. What x-values are in the domain of this function?_ _ _ _ _ _

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Exercise 4

The function $y(x)$ is "Given any number, return 6."

    a. Express this function algebraically, instead of in words: $y(x) =$ _ _ _ _ _ _

    b. Give any three points that could be generated by this function: _ _ _ _ _ _

    c. What x-values are in the domain of this function? _ _ _ _ _ _

Exercise 5

$z(x) = x^2 - 6x + 9$

    a. $z(-1) =$ _ _ _ _ _ _

    b. $z(0) =$ _ _ _ _ _ _

    c. $z(1) =$ _ _ _ _ _ _

    d. $z(3) =$ _ _ _ _ _ _

    e. $z(x+2) =$ _ _ _ _ _ _

    f. $z(z(x)) =$ _ _ _ _ _ _

Exercise 6

Of the following sets of numbers, indicate which ones could possibly have been generated by a function. All I need is a "Yes" or "No"—you don't have to tell me the function! (But go ahead and do, if you want to...)

    a. $(-2, 4) (-1, 1) (0, 0) (1, 1) (2, 4)$

    b. $(4, -2) (1, -1) (0, 0) (1, 1) (4, 2)$

    c. $(2, \pi) (3, \pi) (4, \pi) (5, 1)$

    d. $(\pi, 2) (\pi, 3) (\pi, 4) (1, 5)$

Exercise 7

Make up a function involving **music**.

    a. Write the scenario. Your description should clearly tell me—in words—how one value depends on another.

    b. Name, and clearly describe, two variables. Indicate which is **dependent** and which is **independent**.

    c. Write a function showing how the dependent variable depends on the independent variable. **If you were explicit enough in parts (a) and (b), I should be able to predict your answer to part (c) before I read it**.

    d. Choose a sample number to show how your function works. Explain what the result means.

Exercise 8

Here is an algebraic generalization: for any number x, $x^2 - 25 = (x + 5)(x - 5)$.

    a. Plug $x = 3$ into that generalization, and see if it works.

    b. 20×20 is 400. Given that, and the generalization, can you find 15×25 without a calculator? (Don't just give me the answer, show how you got it!)

Exercise 9

Amy has started a company selling candy bars. Each day, she buys candy bars from the corner store and sells them to students during lunch. The following graph shows her **profit** each day in March.
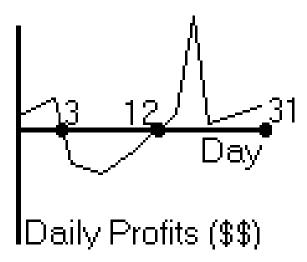
Figure 1

a. On what days did she break even?
b. On what days did she **lose** money?

Exercise 10
The picture below shows the graph of $y = \sqrt{x}$. The graph starts at $(0,0)$ and moves up and to the right forever.
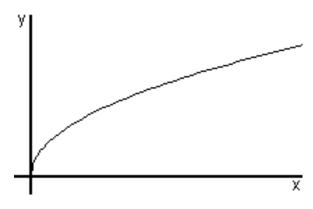

Figure 2

a. What is the domain of this graph?
b. Write a function that looks exactly the same, except that it starts at the point $(-3, 1)$ and moves up-and-right from there.

Exercise 11
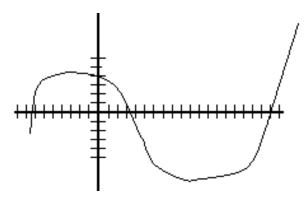The following graph represents the graph $y = f(x)$.

Figure 3

a. Is it a function? Why or why not?
b. What are the zeros?
c. For what $x-$values is it positive?
d. For what $x-$values is it negative?
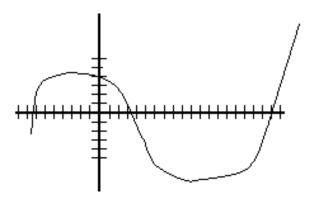**e.** Below is the same function $f(x)$. On that same graph, draw the graph of $y = f(x) - 2$.

Figure 4

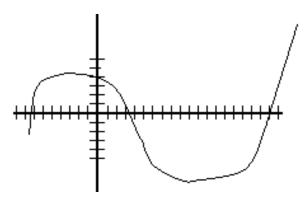**f.** Below is the same function $f(x)$. On that same graph, draw the graph of $y = -f(x)$.

Figure 5

Extra credit:

Here is a cool trick for squaring a difficult number, if the number immediately below it is easy to square.

Suppose I want to find 31^2. That's hard. But it's easy to find 30^2, that's 900. Now, here comes the trick: add 30, and then add 31. $900 + 30 + 31 = 961$. That's the answer! $31^2 = 961$.

- **a.** Use this trick to find 41^2. (Don't just show me the answer, show me the work!)
- **b.** Write the algebraic generalization that represents this trick.