Technical Definition of Functions

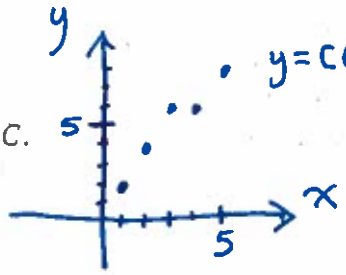
Work within a small group to answer these questions. Do not race through the exercises on your own. Always make sure that your entire group feels good about a question and answer before you move to the next exercise. Ask your group mates for explanations if you feel uncertain about something, and offer your explanations to others when you understand an exercise but someone else may not.

1. A function named C is given by $\{(1,2),(2,4),(3,6),(4,6),(5,8)\}$.

   a) What are the domain and range of C? Give your answers using set notation (with the curly braces).

   domain of C is $\{1,2,3,4,5\}$.
   range of C is $\{2,4,6,8\}$.

   b) Graph C.



   c) What is $C(2)$? What is $C(6)$?

   undefined
   (6 is not in the domain of C)

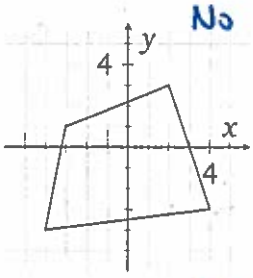
   d) Solve the equation $C(x) = 8$.

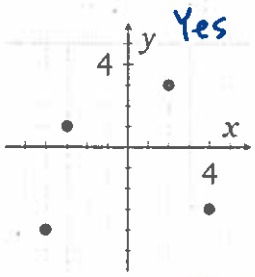
   The only solution is $x = 5$

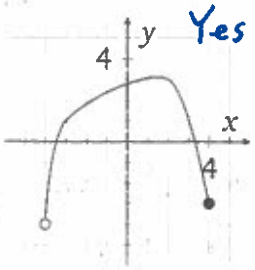
   e) Solve the equation $C(x) = 0$.

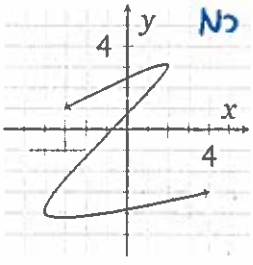
   there are no solutions.

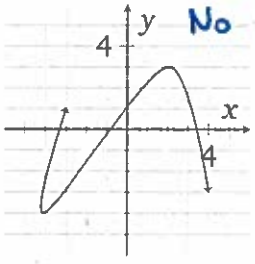
2. Here are some graphs that give relations between x and y. Your job is to determine if the relation can be used to define y as a function of x. For each graph, after you make your decision, say a little bit about why. If you decide that the relation *can* be used to define a function, then you can just say that. But if it *cannot*, then give a reason why. For example, you might say something like "There is more that one possibility for what $f(2)$ would be."

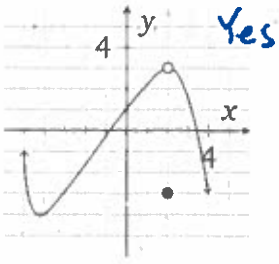












3. Which of these tables describe y as a function of x? For each table, after you make your decision, say a little bit about why. If you decide that the relation *can* be used to define a function, then you can just say that. But if it *cannot*, then give a reason why. For example, you might say something like "There is more that one possibility for what $f(2)$ would be."

x	y
1	-12
2	10
3	8
4	5
5	13
6	11

Yes

x	y
10	3
15	4
20	3
25	4
30	3
35	4

Yes

x	y
−12	9
10	8
8	3
5	−2
13	1
11	1

Yes

x	y
2	−2
4	17
5	1
8	8
4	13
5	10

No because what would $f(5)$ be

x	y
3	−1
8	10
7	14
7	14
12	13
16	−9

Yes

x	y
red	Mercury
orange	Venus
yellow	Earth
green	Mars
blue	Jupiter
purple	Saturn

Yes if you allow an abstract version of functions that don't use numbers as inputs & outputs.

4. For each of these relations between x and y, decide if y is a function of x.

a) $y = 3x - 2$ Yes

b) $2y = 3x - 2$ Yes

c) $y^2 = 3x - 2$ No

d) $x^2 + y^2 = 4$ No

e) $|x| - y^2 = x^2$ No

f) $y = \pm\sqrt{x}$ No

5. Let x represent the height of a person, and y represent their weight. Is y a function of x? If not, explain why not.

No. You could have the same height (x) twice, but they would be matched with two different weights (y).

6. Let x represent the weight of a (1 foot) × (1 foot) × (1 foot) package you want to send through the postal service, and y represent the cost to ship it. Is y a function of x? If not, explain why not.

Yes! For example a 10-lb. box won't cost two different amounts

cost as output

weight as input

7. In the same scenario as the previous question, is x a function of y? If not, explain why not.

Suppose a package costs \$10 to ship, it's possible there is more than one weight associated with \$10.

cost as input

weight as output

No!