Math 111 First Day Warm Up Name: Solutions

1. Determine which of the following relations are classified as functions.

a.

State	Number of Representatives
Alaska	7
Arizona	8
California	53
Colorado	7
Florida	25
North Dakota	1

Yes, each state outputs a single # of reps.

b. The set of ordered pairs {(eye color, students in this class)}.

No, most eye colors will probably output more than one student.

c. $\{(-4,2),(-2,3),(0,14.2),(7,25),(10,3)\}$

Yes, each x outputs one y.

d. $\{(-4,2),(-2,2),(0,2),(7,2),(10,2)\}$

Yes, each x outputs one y.

2. Write one or two sentences describing your understanding of what a relationship between inputs and outputs in mathematics is.

A relationship between inputs & outputs describes how an output(s) is(are) determined for a given input. It is a math machine.

The domain is the set of inputs & The range is the set of outputs.

3. What is the one requirement necessary for a relationship between inputs and outputs to be considered a function?

Each input may have, at most, one output.

4. Give an example of an equation which you are certain is a function. Make sure to describe which variable is the input and which is the output. Try to use the language "[blank] is a function of [blank]."

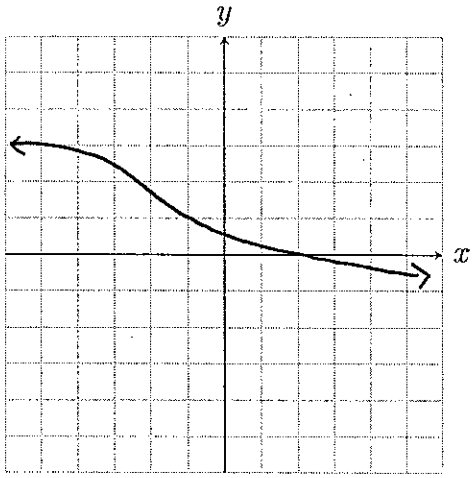
$y = x^2$ where y is a function of x
(y: the output, x: the input)

5. Give an example of an equation which you are certain is not a function. Explain how you know this. Again, talk about which variable is the input and which is the output.

$y^2 = x$ where x is the input & y the output.

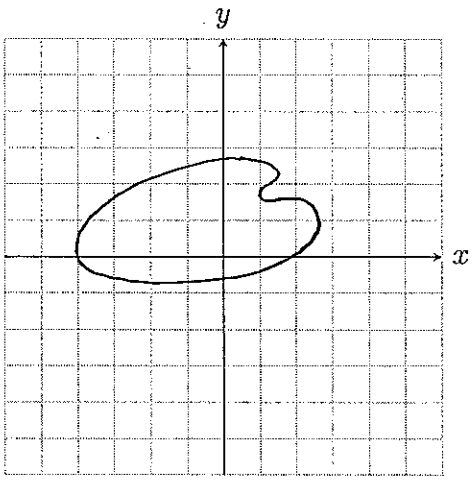
Not a function since if $x = 1$, y could be $+1$ or -1.

6. Sketch an example of a graph that you are certain is a function.



Answers may vary.

7. Sketch an example of a graph that you are certain is *not* a function.



Answers may vary

8. Describe what it is, in context of the definition of a function, about the graphs you just drew that makes them a function or not a function.

For #6 (left), each x value (input) has exactly one output (y-value).

For #7, when the input is $x = -1$ (& at many other x values) the graph has 2 outputs (y-values). For $x = -1$, $y \approx -.75$ or $y \approx 2.5$.

9. Suppose you have a function f with the following points on its graph. Describe these points using function notation and state which value is the input and which is the output.

a. $(2, -3)$ $f(2) = -3$

2 is the input, -3 the output

b. $(0.5, 9)$

$f(0.5) = 9$

0.5 is the input, 9 the output.

10. Suppose you have the following relationships between inputs and outputs described using function notation below. For each, describe the corresponding point on the graph of f and state which value is the input and which is the output.

a. $f(-5) = 6$ $(-5, 6)$

input ↑ output ↑

b. $f(0) = -11$ $(0, -11)$

input ↑ output ↑

11. Match each word with the phrase that best describes it. You may use phrases more than once or not at all.

3	a. Dependent Variable	1. A set of ordered pairs. (A correspondence between 2 sets.)
7	b. Domain	2. the input variable (often x)
2	c. Independent Variable	3. the output variable (often y)
8	d. Horizontal Intercept	4. (x, y) coordinate. Also known as a point.
5	e. Range	5. The set of possible output values of the function.
1	f. Relation	6. $(0, y)$
11	g. Vertex	7. The set of all possible input values of the function.
6	h. Vertical Intercept	8. $(x, 0)$
8	i. x-intercept	9. $y = f(x)$
6	j. y-intercept	10. A set of ordered pairs in which each input is paired with exactly one and only one element of the output.
		11. The (x, y) that is the maximum or minimum of a parabola.

12. The functions f, g, and h are described below. Use them to answer the following questions.

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x	$f(x)$
-1	-5
0	1
1	3
2	1
3	-5

- $g(x) = \sqrt{2x+5}$
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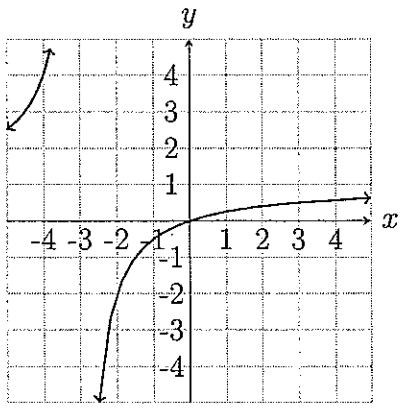


Figure 1: $y = h(x)$

a. Evaluate $f(2)$

$f(2) = 1$

b. Evaluate $g(-3)$

$g(-3) = i$ (is not real)

c. Evaluate $h(-3)$

$h(-3)$ is undefined.

d. Describe the function f using a set of ordered pairs.

$\{(-1,-5), (0,1), (1,3), (2,1), (3,-5)\}$.

e. What is the domain and range of g?

$D = \{x \mid x \geq -5/2\}$

$R = \{y \mid y \geq 0\}$.

f. What is the domain and range of f?

$D = \{-1, 0, 1, 2, 3\}$

$R = \{-5, 1, 3\}$

g. Solve $f(x) = -5$.

The solution set is $\{3\}$.

h. Solve $h(x) = 4$.

The solution set is $\{-4\}$.

i. For what values of x is $h(x) < -2$?

when $-3 < x < -2$

j. List any intercepts of h.

$(0,0)$

k. Solve $g(x) = 3$.

The solution set is $\{2\}$.

l. What is the domain and range of h?

$D = \{x \mid x \neq -3\}$.

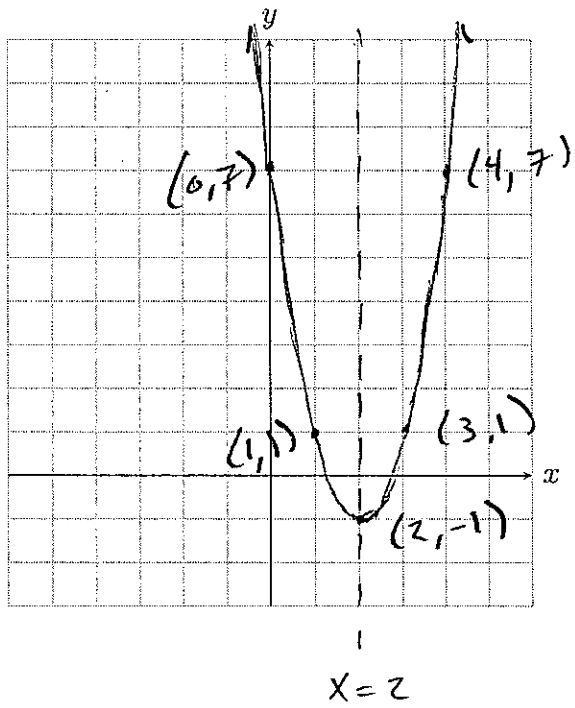
$R = \{y \mid y \neq 1\}$.

13. Make a table for and then graph $y = f(x) = 2x^2 - 8x + 7$ in the space provided. Label all points from the table along with the axis of symmetry.

x	$f(x)$
0	7
1	1
2	-1
3	1
4	7

$x_v = \frac{8}{2(2)} = 2$

$f(2) = -1$



14. What is the domain and range of $f(x) = 2x^2 - 8x + 7$?

$D = \mathbb{R}$, $R = [-1, \infty)$

15. Solve the following equations. Make sure to check your solutions to part (b)!

a. $g(x) = 0$, where $g(x) = x^2 - 3x + 6$.

$0 = x^2 - 3x + 6$

$x = \frac{3 \pm \sqrt{9 - 4(1)(6)}}{2}$

$= \frac{3 \pm \sqrt{-15}}{2}$

$= \frac{3}{2} \pm \frac{\sqrt{15}}{2} i$

b. $\left(\frac{3}{x+3} - 2\right) = \left(\frac{x}{x+3}\right)$ $(x+3)$

$3 - 2(x+3) = x$

$3 - 2x - 6 = x$

$+2x \quad +2x$

$-3 = 3x$

$x = -1$

Check:

$\frac{3}{-1+3} - 2 \stackrel{?}{=} \frac{-1}{-1+3}$

$\frac{3}{2} - \frac{4}{2} \stackrel{?}{=} -\frac{1}{2}$

$-\frac{1}{2} = -\frac{1}{2}$ ✓