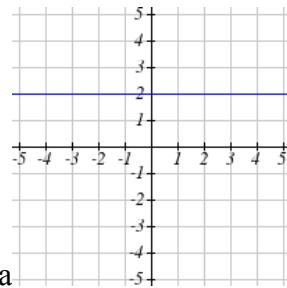


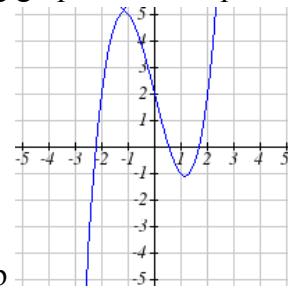
Name: _____

What is a function?

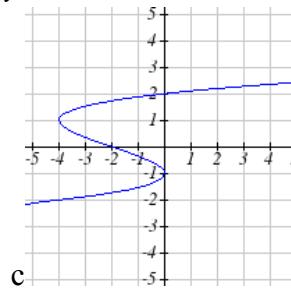
1. The amount of garbage, G , produced by a city with population p is given by $G = f(p)$. G is measured in tons per week, and p is measured in thousands of people.
 - a. The town of Tola has a population of 40,000 and produces 13 tons of garbage each week. Express this information in terms of the function f .
 - b. Explain the meaning of the statement $f(5) = 2$.
2. The number of cubic yards of dirt, D , needed to cover a garden with area a square feet is given by $D = g(a)$.
 - a. A garden with area 5000 ft^2 requires 50 cubic yards of dirt. Express this information in terms of the function g .
 - b. Explain the meaning of the statement $g(100) = 1$.
3. Let $f(t)$ be the number of ducks in a lake t years after 1990. Explain the meaning of each statement:
 - a. $f(5) = 30$
 - b. $f(10) = 40$
4. Let $h(t)$ be the height above ground, in feet, of a rocket t seconds after launching. Explain the meaning of each statement:
 - a. $h(1) = 200$
 - b. $h(2) = 350$
5. Select all of the following graphs which represent y as a function of x .



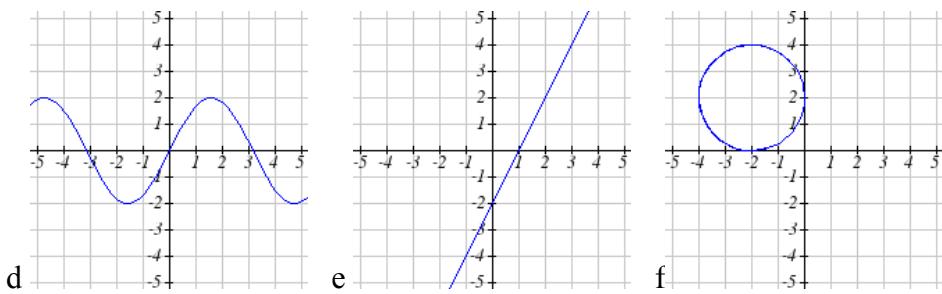
a



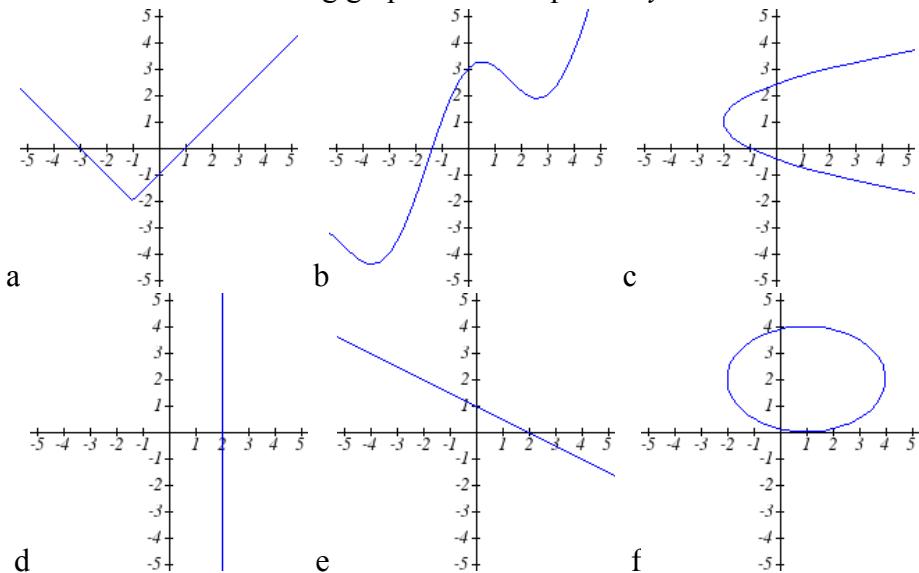
b



c



6. Select all of the following graphs which represent y as a function of x .



7. Select all of the following tables which represent y as a function of x .

a.	<table border="1"> <tr> <td>x</td><td>5</td><td>10</td><td>15</td></tr> <tr> <td>y</td><td>3</td><td>8</td><td>14</td></tr> </table>	x	5	10	15	y	3	8	14
x	5	10	15						
y	3	8	14						

b.	<table border="1"> <tr> <td>x</td><td>5</td><td>10</td><td>15</td></tr> <tr> <td>y</td><td>3</td><td>8</td><td>8</td></tr> </table>	x	5	10	15	y	3	8	8
x	5	10	15						
y	3	8	8						

c.	<table border="1"> <tr> <td>x</td><td>5</td><td>10</td><td>10</td></tr> <tr> <td>y</td><td>3</td><td>8</td><td>14</td></tr> </table>	x	5	10	10	y	3	8	14
x	5	10	10						
y	3	8	14						

8. Select all of the following tables which represent y as a function of x .

a.	<table border="1"> <tr> <td>x</td><td>2</td><td>6</td><td>13</td></tr> <tr> <td>y</td><td>3</td><td>10</td><td>10</td></tr> </table>	x	2	6	13	y	3	10	10
x	2	6	13						
y	3	10	10						

b.	<table border="1"> <tr> <td>x</td><td>2</td><td>6</td><td>6</td></tr> <tr> <td>y</td><td>3</td><td>10</td><td>14</td></tr> </table>	x	2	6	6	y	3	10	14
x	2	6	6						
y	3	10	14						

c.	<table border="1"> <tr> <td>x</td><td>2</td><td>6</td><td>13</td></tr> <tr> <td>y</td><td>3</td><td>10</td><td>14</td></tr> </table>	x	2	6	13	y	3	10	14
x	2	6	13						
y	3	10	14						

9. Select all of the following tables which represent y as a function of x .

a.	<table border="1"> <tr> <td>x</td><td>y</td></tr> <tr> <td>0</td><td>-2</td></tr> <tr> <td>3</td><td>1</td></tr> <tr> <td>4</td><td>6</td></tr> <tr> <td>8</td><td>9</td></tr> <tr> <td>3</td><td>1</td></tr> </table>	x	y	0	-2	3	1	4	6	8	9	3	1
x	y												
0	-2												
3	1												
4	6												
8	9												
3	1												

b.	<table border="1"> <tr> <td>x</td><td>y</td></tr> <tr> <td>-1</td><td>-4</td></tr> <tr> <td>2</td><td>3</td></tr> <tr> <td>5</td><td>4</td></tr> <tr> <td>8</td><td>7</td></tr> <tr> <td>12</td><td>11</td></tr> </table>	x	y	-1	-4	2	3	5	4	8	7	12	11
x	y												
-1	-4												
2	3												
5	4												
8	7												
12	11												

c.	<table border="1"> <tr> <td>x</td><td>y</td></tr> <tr> <td>0</td><td>-5</td></tr> <tr> <td>3</td><td>1</td></tr> <tr> <td>3</td><td>4</td></tr> <tr> <td>9</td><td>8</td></tr> <tr> <td>16</td><td>13</td></tr> </table>	x	y	0	-5	3	1	3	4	9	8	16	13
x	y												
0	-5												
3	1												
3	4												
9	8												
16	13												

d.	<table border="1"> <tr> <td>x</td><td>y</td></tr> <tr> <td>-1</td><td>-4</td></tr> <tr> <td>1</td><td>2</td></tr> <tr> <td>4</td><td>2</td></tr> <tr> <td>9</td><td>7</td></tr> <tr> <td>12</td><td>13</td></tr> </table>	x	y	-1	-4	1	2	4	2	9	7	12	13
x	y												
-1	-4												
1	2												
4	2												
9	7												
12	13												

10. Select all of the following tables which represent y as a function of x .

a.

x	y
-4	-2
3	2
6	4
9	7
12	16

b.

x	y
-5	-3
2	1
2	4
7	9
11	10

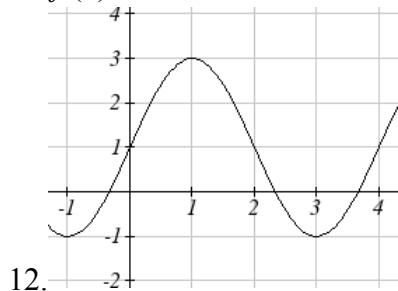
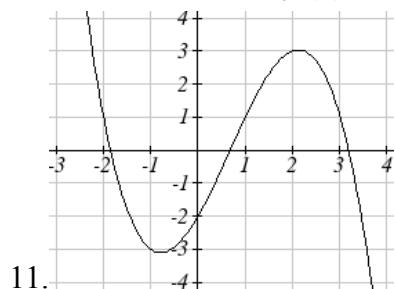
c.

x	y
-1	-3
1	2
5	4
9	8
1	2

d.

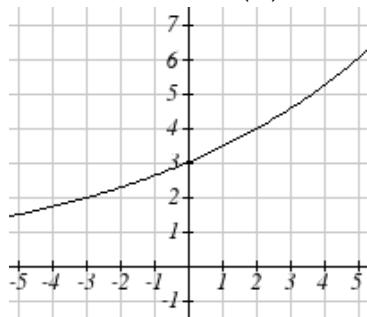
x	y
-1	-5
3	1
5	1
8	7
14	12

Given each function $f(x)$ graphed, evaluate $f(1)$ and $f(3)$



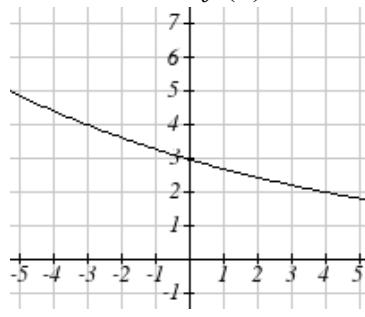
13. Given the function $g(x)$ graphed here,

- Evaluate $g(2)$
- Solve $g(x)=2$



14. Given the function $f(x)$ graphed here.

- Evaluate $f(4)$
- Solve $f(x)=4$



15. Based on the table below,

- Evaluate $f(3)$
- Solve $f(x)=1$

x	0	1	2	3	4	5	6	7	8	9
$f(x)$	74	28	1	53	56	3	36	45	14	47

16. Based on the table below,

- Evaluate $f(8)$
- Solve $f(x)=7$

x	0	1	2	3	4	5	6	7	8	9
$f(x)$	62	8	7	38	86	73	70	39	75	34

For each of the following functions, evaluate: $f(-2)$, $f(-1)$, $f(0)$, $f(1)$, and $f(2)$

17. $f(x) = 4 - 2x$

18. $f(x) = 8 - 3x$

19. $f(x) = 8x^2 - 7x + 3$

20. $f(x) = 6x^2 - 7x + 4$

21. $f(x) = -x^3 + 2x$

22. $f(x) = 5x^4 + x^2$

23. $f(x) = 3 + \sqrt{x+3}$

24. $f(x) = 4 - \sqrt[3]{x-2}$

25. $f(x) = (x-2)(x+3)$

26. $f(x) = (x+3)(x-1)^2$

27. $f(x) = \frac{x-3}{x+1}$

28. $f(x) = \frac{x-2}{x+2}$

29. $f(x) = 2^x$

30. $f(x) = 3^x$

31. Suppose $f(x) = x^2 + 8x - 4$. Compute the following:

a. $f(-1) + f(1)$ b. $f(-1) - f(1)$

32. Suppose $f(x) = x^2 + x + 3$. Compute the following:

a. $f(-2) + f(4)$ b. $f(-2) - f(4)$

33. Let $f(t) = 3t + 5$

a. Evaluate $f(0)$ b. Solve $f(t) = 0$

34. Let $g(p) = 6 - 2p$

a. Evaluate $g(0)$ b. Solve $g(p) = 0$

Selected Answers:

1. (a) $f(40) = 13$, because the input 40 (in thousands of people) gives the output 13 (in tons of garbage)

(b) $f(5) = 2$, means that 5000 people produce 2 tons of garbage per week.

3. (a) In 1995 (5 years after 1990) there were 30 ducks in the lake.

(b) In 2000 (10 years after 1990) there were 40 ducks in the lake.

5. Graphs (a) (b) (d) and (e) represent y as a function of x because for every value of x there is only one value for y . Graphs (c) and (f) are not functions because they contain points that have more than one output for a given input, or values for x that have 2 or more values for y .

7. Tables (a) and (b) represent y as a function of x because for every value of x there is only one value for y . Table (c) is not a function because for the input $x=10$, there are two different outputs for y .

9. Tables (a) (b) and (d) represent y as a function of x because for every value of x there is only one value for y . Table (c) is not a function because for the input $x=3$, there are two different outputs for y .

11. (a) $f(1) = 1$ (b) $f(3) = 1$

13. (a) $g(2) = 4$ (b) $g(-3) = 2$

15. (a) $f(3) = 53$ (b) $f(2) = 1$

17. $f(-2) = 4 - 2(-2) = 4 + 4 = 8, f(-1) = 6, f(0) = 4, f(1) = 4 - 2(1) = 4 - 2 = 2, f(2) = 0$

19. $f(-2) = 8(-2)^2 - 7(-2) + 3 = 8(4) + 14 + 3 = 32 + 14 + 3 = 49, f(-1) = 18, f(0) = 3, f(1) = 8(1)^2 - 7(1) + 3 = 8 - 7 + 3 = 4, f(2) = 21$

21. $f(-2) = -(-2)^3 + 2(-2) = -(-8) - 4 = 8 - 4 = 4, f(-1) = -(-1)^3 + 2(-1) = -(-1) - 2 = -1, f(0) = 0, f(1) = -(1)^3 + 2(1) = 1, f(2) = -4$

23. $f(-2) = 3 + \sqrt{(-2) + 3} = 3 + \sqrt{1} = 3 + 1 = 4, f(-1) = \sqrt{2} + 3 \approx 4.41, f(0) = \sqrt{3} + 3 \approx 4.73, f(1) = 3 + \sqrt{(1) + 3} = 3 + \sqrt{4} = 3 + 2 = 5, f(2) = \sqrt{5} + 3 \approx 5.23$

$$25. f(-2) = ((-2)-2)((-2)+3) = (-4)(1) = -4, f(-1) = -6, f(0) = -6, f(1) = ((1)-2)((1)+3) = (-1)(4) = -4, f(2) = 0$$

$$27. f(-2) = \frac{(-2)-3}{(-2)+1} = \frac{-5}{-1} = 5, f(-1) = \text{undefined}, f(0) = -3, f(1) = -1, f(2) = -1/3$$

$$29. f(-2) = 2^{-2} = \frac{1}{2^2} = \frac{1}{4}, f(-1) = \frac{1}{2}, f(0) = 1, f(1) = 2, f(2) = 4$$

$$31. \text{(a)} \quad -8 \qquad \qquad \qquad \text{(b)} \quad -18$$

$$33. \text{(a)} \quad f(0) = 5 \qquad \qquad \qquad \text{(b)} \quad f\left(-\frac{5}{3}\right) = 0$$