

MCF3M, Unit 1, Quiz 1

1. Given that $f(x) = 2x^2 - 6x + 7$ and $h(x) = -6x^2 + 2$, evaluate:

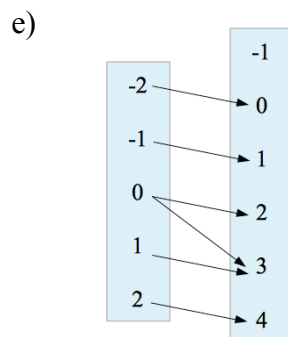
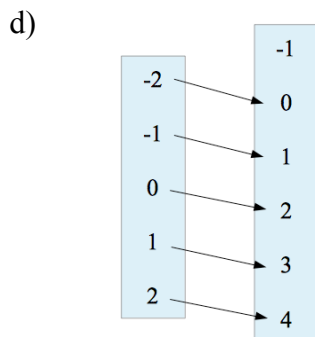
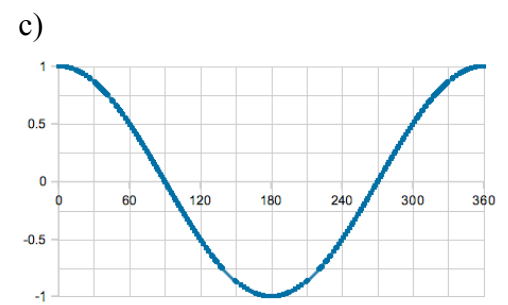
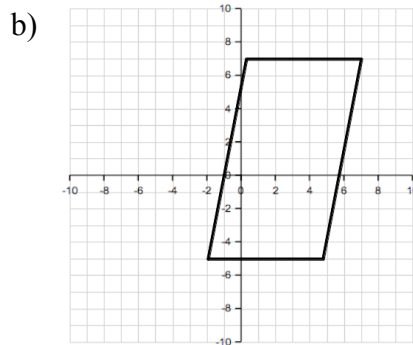
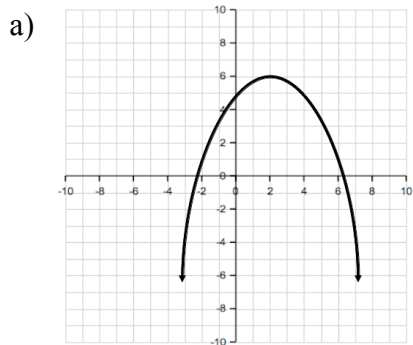
a) $f(-2)$

b) $f\left(\frac{1}{2}\right)$

c) $h(2x)$

d) $h(4) - h(2)$

2. Are each of the following relationships “**functions**”?

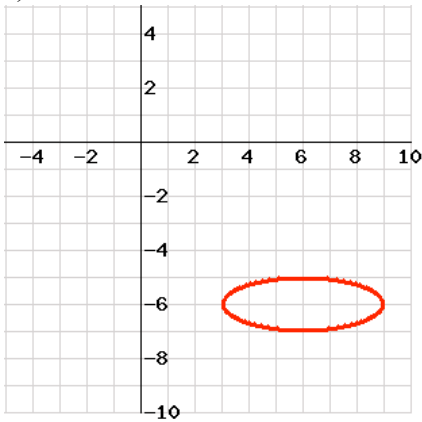


f) $\{(0,1), (1,2), (1,3), (2,4)\}$

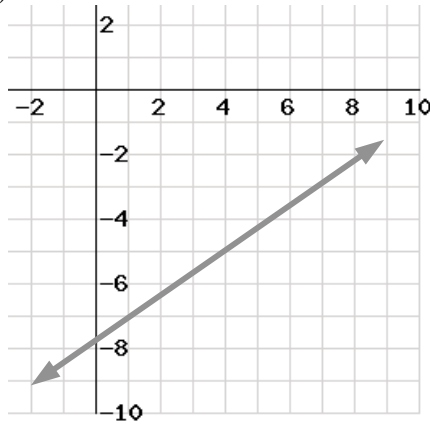
Domain and Range

3. Find the domain and range of each of the following functions:

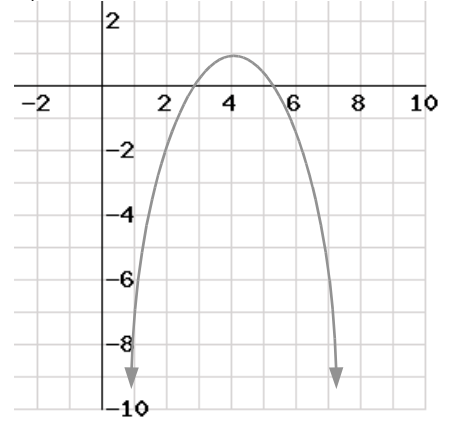
a)



b)



c)



4. What is the domain and range for each of the following functions?

Hint: Find the vertex, and the direction of opening.

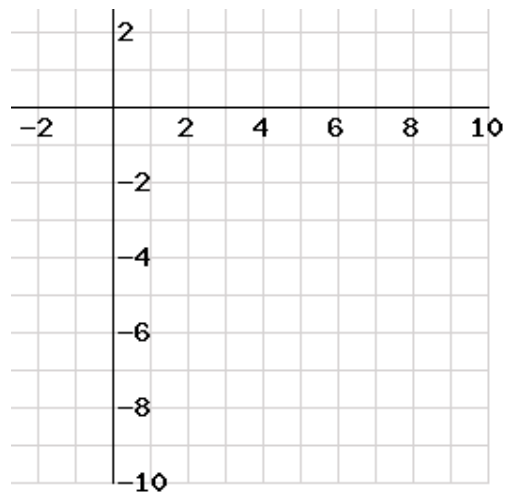
a) $g(x) = 4(x-7)^2 + 9$

b) $y = -\frac{1}{4}(x+9)^2$

5. Draw a curve with the following domain and range. It does not have to be a “**function**”.

$$D: \{2 \leq x \leq 9, x \in \mathbb{R}\}$$

$$R: \{-9 \leq y \leq -2, y \in \mathbb{R}\}$$



6. A cab charges \$3.00 plus \$0.25 per kilometer driven.
Let $C(d)$ be the cost of a cab ride that lasts d kilometers.

a) Create a function for $C(d)$.

b) How much will a cab ride cost if you travel 14 km?

c) Assuming the cab driver will only drive you 200 km at maximum, what are the domain and range of this function?

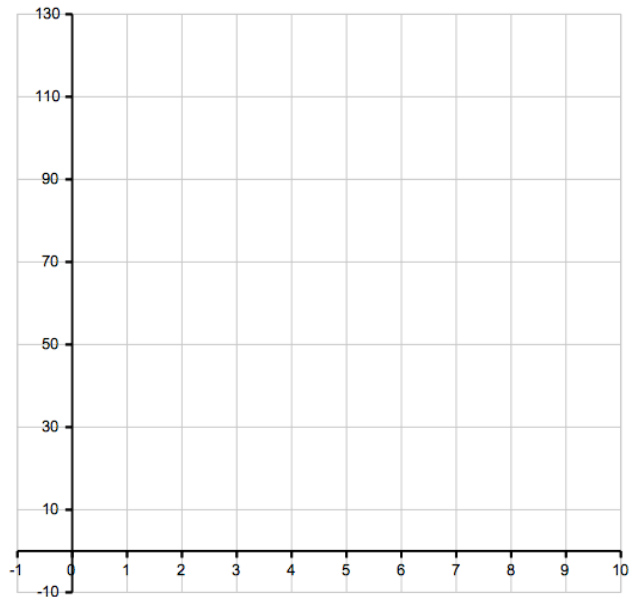
7. A ball is thrown from the top of a 45-m tall building. It reaches a maximum height of 125 m after 4 s and hits the ground after 9 s.

a) Sketch this scenario on the graph to the right.

b) What is the domain and range of this function?

c) Create a function $h(t)$ which gives the height h after t seconds have elapsed.

Hint: What's the vertex? Then plug in another point to solve for "a".



8. Identify each of the following as linear, quadratic, or neither.

a)

x	y
2	3
3	6
4	9
5	12
6	15
7	18
8	21
9	24

b)

x	y
-3	-75
-2	-36
-1	-11
0	0
1	-3
2	-20
3	-51
4	-96

Answers

1. Given that $f(x)=2x^2-6x+7$ and $h(x)=-6x^2+2$, evaluate:

a) $f(-2)$

$$\begin{aligned} &= 2(-2)^2 - 6(-2) + 7 \\ &= 8 + 12 + 7 \\ &= 27 \end{aligned}$$

b) $f\left(\frac{1}{2}\right)$

$$\begin{aligned} &= 2\left(\frac{1}{2}\right)^2 - 6\left(\frac{1}{2}\right) + 7 \\ &= 0.5 - 3 + 7 \\ &= 4.5 \end{aligned}$$

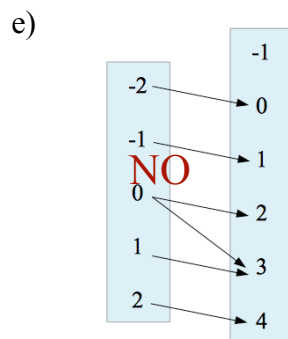
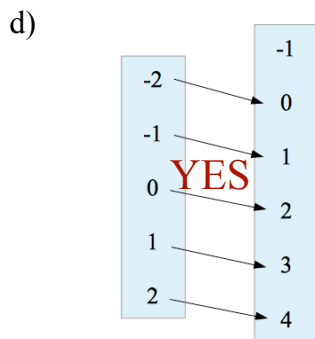
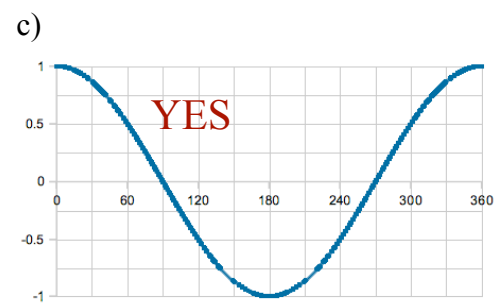
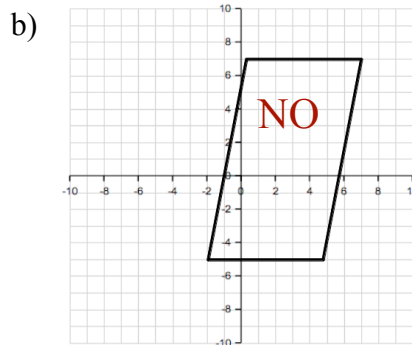
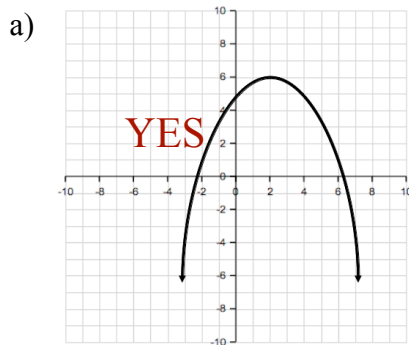
c) $h(2x)$

$$\begin{aligned} &= -6(2x)^2 + 2 \\ &= -6(4x^2) + 2 \\ &= -24x^2 + 2 \end{aligned}$$

d) $h(4) - h(2)$

$$\begin{aligned} &= [-6(4)^2 + 2] - [-6(2)^2 + 2] \\ &= [-96 + 2] - [-24 + 2] \\ &= [-94] - [-22] \\ &= -72 \end{aligned}$$

2. Are each of the following relationships “functions”?

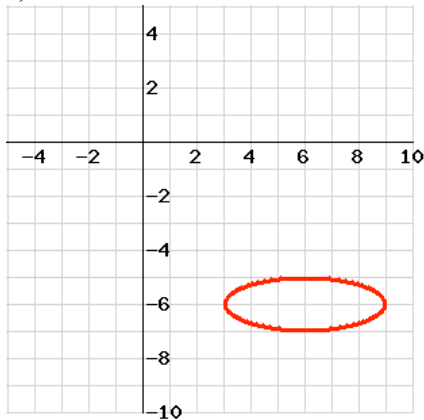


f) $\{ (0,1), (1,2), (1,3), (2,4) \}$
NO

Domain and Range

3. Find the domain and range of each of the following functions:

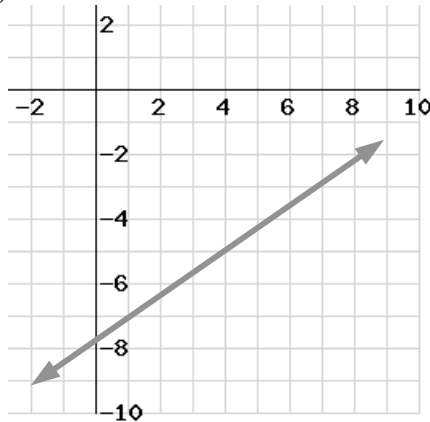
a)



$$D: \{x | 3 \leq x \leq 9, x \in \mathbb{R}\}$$

$$R: \{y | -7 \leq y \leq -5, y \in \mathbb{R}\}$$

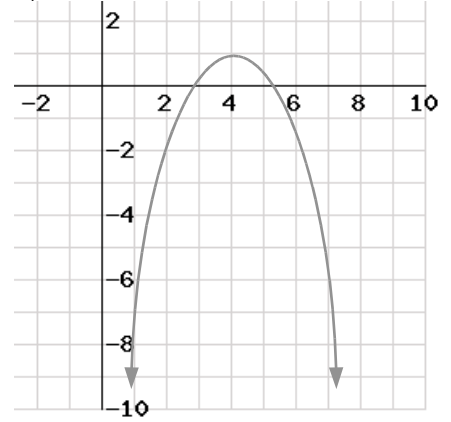
b)



$$D: \{x | x \in \mathbb{R}\}$$

$$R: \{y | y \in \mathbb{R}\}$$

c)



$$D: \{x | x \in \mathbb{R}\}$$

$$R: \{y | y \leq 1, y \in \mathbb{R}\}$$

4. What is the domain and range for each of the following functions?

Hint: Find the vertex, and the direction of opening.

a)

$$g(x) = 4(x-7)^2 + 9$$

Vertex: (7,9)

Direction of opening: Up

$$D: \{x | x \in \mathbb{R}\}$$

$$R: \{y | 9 \leq y, y \in \mathbb{R}\}$$

b)

$$y = -\frac{1}{4}(x+9)^2$$

Vertex: (-9,0)

Direction of opening: Down

$$D: \{x | x \in \mathbb{R}\}$$

$$R: \{y | y \leq 0, y \in \mathbb{R}\}$$

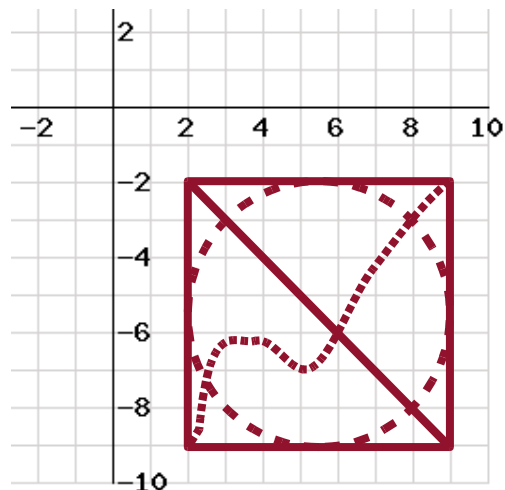
5. Draw a curve with the following domain and range. It does not have to be a “function”.

$$D: \{2 \leq x \leq 9, x \in \mathbb{R}\}$$

$$R: \{-9 \leq y \leq -2, y \in \mathbb{R}\}$$

As long as your shape touches all four sides of this square (or opposite corners), you are correct. I have drawn a few suggestions.

- line
- circle
- curve
- even the square itself could work



6. A cab charges \$3.00 plus \$0.25 per kilometer driven.
Let $C(d)$ be the cost of a cab ride that lasts d kilometers.

a) Create a function for $C(d)$.

$$C(d) = 3 + 0.25d$$

b) How much will a cab ride cost if you travel 14 km?

$$\begin{aligned} C(14) &= 3 + 0.25(14) \\ &= 3 + 3.5 = \$ 6.50 \end{aligned}$$

c) Assuming the cab driver will only drive you 200 km at maximum, what are the domain and range of this function?

Maximum cost: $C(200) = 3 + 0.25(200) = 3 + 50 = 53$

$$D: \{d \mid 0 \leq d \leq 200, d \in \mathbb{R}\}$$

Note: I used d and C here because there's no x and y .

$$R: \{C \mid 3 \leq C \leq 53, C \in \mathbb{R}\}$$

7. A ball is thrown from the top of a 100-m tall building. It reaches a maximum height of 125 m after 4 s and hits the ground after 9 s.

a) Sketch this scenario on the graph to the right.

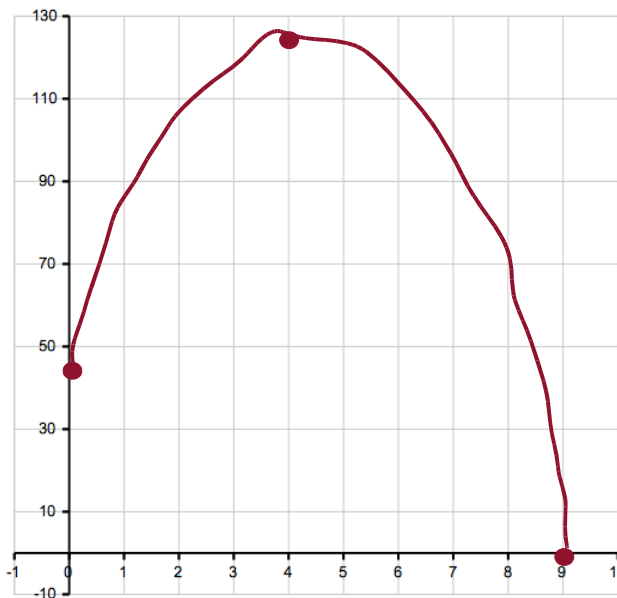
b) What is the domain and range of this function?

$$D: \{x \mid 0 \leq x \leq 9, x \in \mathbb{R}\}$$

$$R: \{y \mid 0 \leq y \leq 125, y \in \mathbb{R}\}$$

c) Create a function $h(t)$ which gives the height h after t seconds have elapsed.

Hint: What's the vertex? Then plug in another point to solve for "a".



Vertex: (4,125)

$$y = a(x - 4)^2 + 125$$

Pick a point: Like (0,45), and plug it in.

$$45 = a(0 - 4)^2 + 125$$

$$45 - 125 = 16a$$

$$-80 = 16a$$

$$a = \frac{-80}{16} = -5$$

so it's $y = -5(x - 4)^2 + 125$

8. Identify each of the following as linear, quadratic, or neither.

a)

x	y
2	3
3	6
4	9
5	12
6	15
7	18
8	21
9	24

> 3
> 3
> 3
> 3
> 3
> 3
> 3

First differences constant → LINEAR

b)

x	y
-3	-75
-2	-36
-1	-11
0	0
1	-3
2	-20
3	-51
4	-96

> 39
> 25
> 11
> -3
> -17
> -31
> -45

> -14
> -14
> -14
> -14
> -14
> -14

Second differences constant → QUADRATIC