

Are there any Assigned Practice Questions you would like to see on the board?

p. 542 # 1acfh, 2

1. Graph each quadratic relation. Use your graph to determine

- i) the vertex of the parabola
- ii) the axis of symmetry
- iii) the  $y$ -intercept
- iv) the  $x$ -intercept(s), if any

a)  $y = x^2 - 1$

c)  $y = 2x^2 + 2$

f)  $y = (x - 2)^2 + 3$

h)  $y = 4 - 2(x + 1)^2$

$$y = a(x-h)^2 + k$$

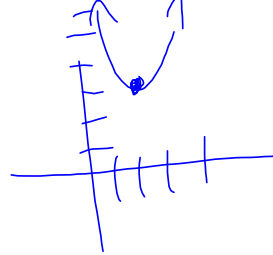
$$(2, 3)$$

$$x = 2$$

$$y = (0 - 2)^2 + 3$$

$$= 4 + 3$$

$$= 7$$



2. A stone is thrown from a cliff. Its motion is described by  $y = -5x^2 + 10x + 20$ . In this quadratic relation,  $y$  is the stone's height above the sea (in metres) and  $x$  is the horizontal distance (in metres) the stone has travelled.

- a) Graph the quadratic relation.
- b) Locate the vertex. What is the stone's maximum height, and how far is it horizontally from the edge of the cliff at this point?
- c) What information does the  $y$ -intercept give you about the cliff?
- d) Locate the  $x$ -intercepts. Is the intercept with  $x$  negative meaningful? Why or why not? What is the meaning of the other  $x$ -intercept?

# Today's Learning Goal(s):

By the end of the class, I will be able to:

- a) Determine if a relation is a function (or not) given a mapping notation.
- b) Determine if a relation is a function (or not) given a graph.

MCF 3MI

## 1.0 & 1.1 Characteristics of a Function

Date: Sept 11/19  
(Every lesson)

Review:

Ex.1: Identify which of the following are linear or quadratic:

a)  $y = 5x + 2$

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

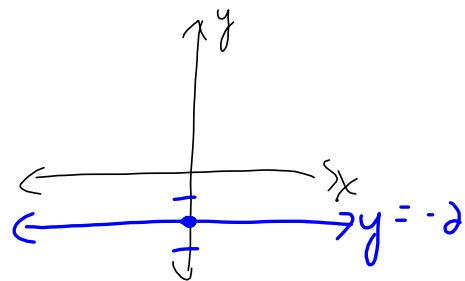
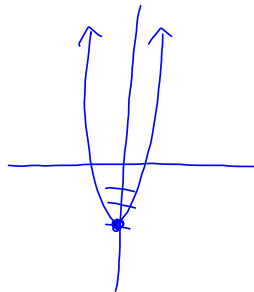
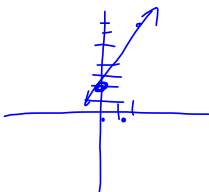
c)  $y = -2$

↳ line

↳ quadratic ( $x^2$ )

horizontal line

$y = mx + b$   
↳ no exponents



Ex.2: For each relation, determine the y-intercept and the axis of symmetry.

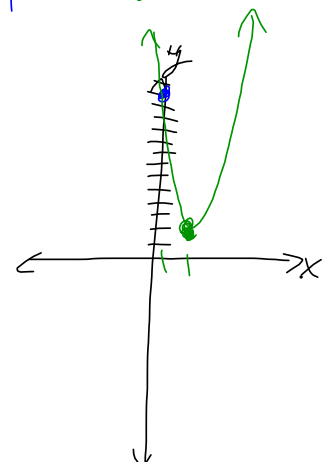
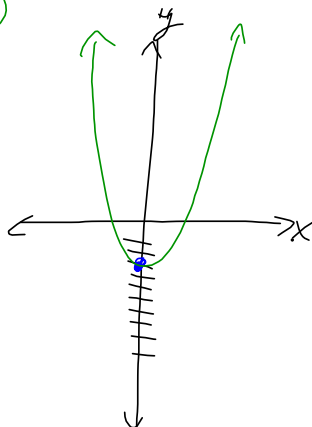
a)  $y = x^2 - 3$

b)  $y = 3(x - 2)^2 + 1$

y-int, let  $x=0$   
 $y = (0)^2 - 3$   
 $y = -3$   
 vertex  $(0, -3)$   
 Axis:  $x = 0$

y-int, let  $x=0$   
 $y = 3(0 - 2)^2 + 1$   
 $= 3(-2)^2 + 1$   
 $= 3(4) + 1$   
 $= 12 + 1$   
 $= 13$   
 vertex  $(2, 1)$   
 Axis:  $x = 2$

$y = (x - 0)^2 - 3$



Domain and range describe all the possible values of the relation.

Domain describes ALL of the  $x$ -values.

Range describes ALL of the  $y$ -values.

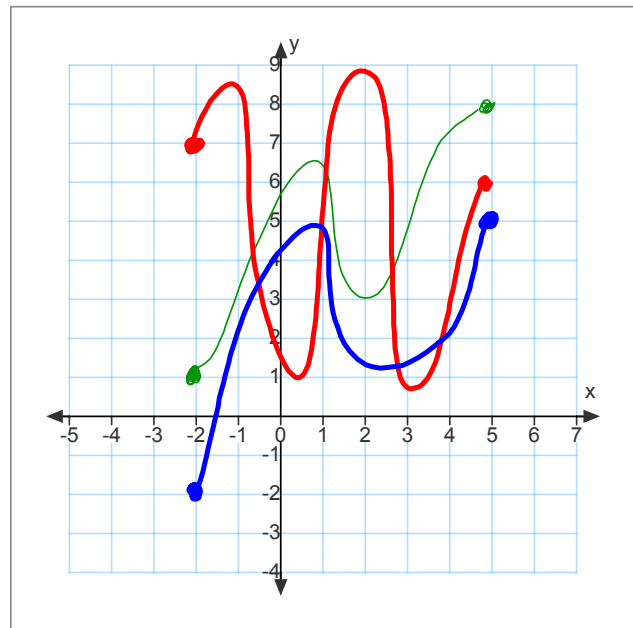
We use set notation to mathematically write the domain & range.

For example:

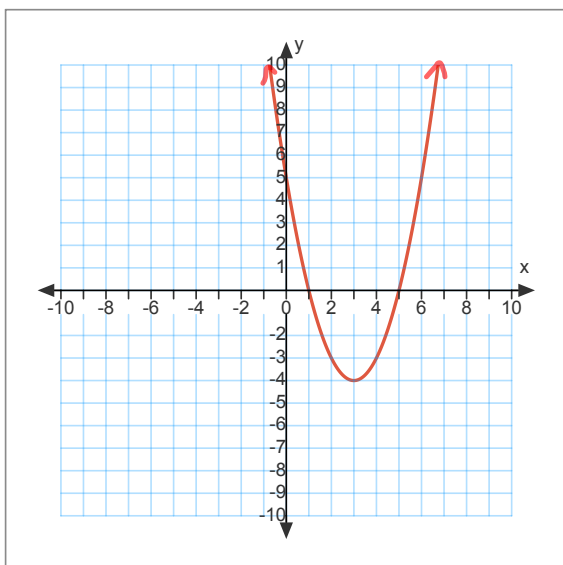
$$D = \{x \in \mathbb{R} \mid -2 \leq x \leq 5\}$$

→  
→

$$R = \{y \in \mathbb{R} \mid y \geq -2\}$$



Ex.3: State the domain and range of the quadratic function below:



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

$$R: \{y \in \mathbb{R} \mid y \geq -4\}$$

A function is a relation that has a one-to-one relationship. This means that for every  $x$ -value there is only one  $y$ -value.

Ex.4: For each of the following relations, determine the domain & range, then state whether or not it is a function.

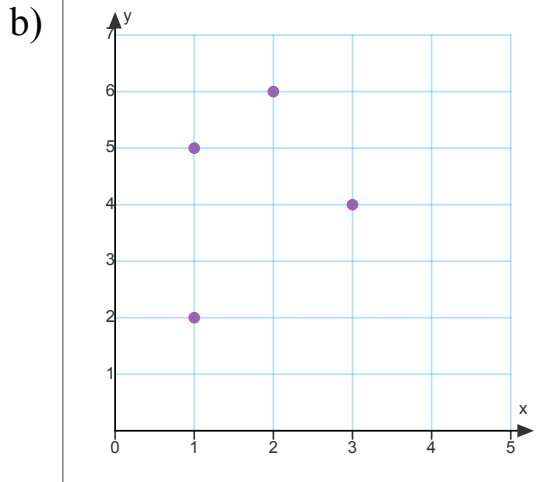
a)

$x$	$y$
-1	-3
0	1
1	5
2	9

D:  $\{-1, 0, 1, 2\}$

R:  $\{-3, -1, 5, 9\}$

Yes Function  
 $\hookrightarrow x$  does NOT Repeat.



D:  $\{1, 2, 3\}$

R:  $\{2, 4, 5, 6\}$

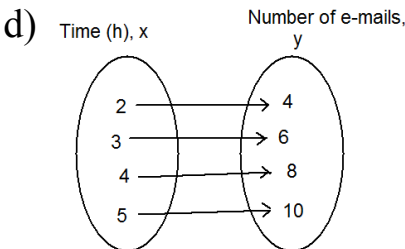
NOT a function  
 $\hookrightarrow x=1$  in 2 places  
 $\hookrightarrow$  Domain is smaller than the range  
 $\hookrightarrow$  Fails VLT

c)  $G:(x, y) = \{\text{number of golfers, score below or above par}\}$   
 $= \{(0, -2), (0, -1), (0, 0), (1, 5)\}$

D:  $\{0, 0, 0, 1\}$  or  $\{0, 1\}$

R:  $\{-2, -1, 0, 5\}$

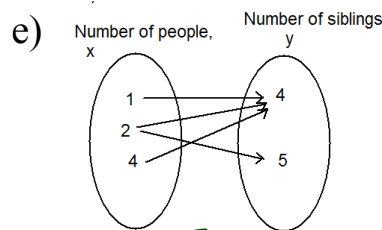
NOT a function  
 $x=0$  repeats



D:  $\{2, 3, 4, 5\}$

R:  $\{4, 6, 8, 10\}$

Yes, FUNCTION

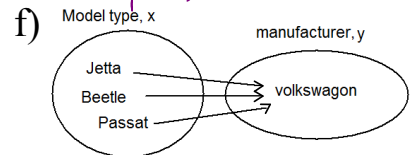


D:  $\{1, 2, 4\}$

R:  $\{4, 5\}$

NOT a function,

2 maps to 2 y values  
 $\hookrightarrow (2, 4) + (2, 5)$  are both possible

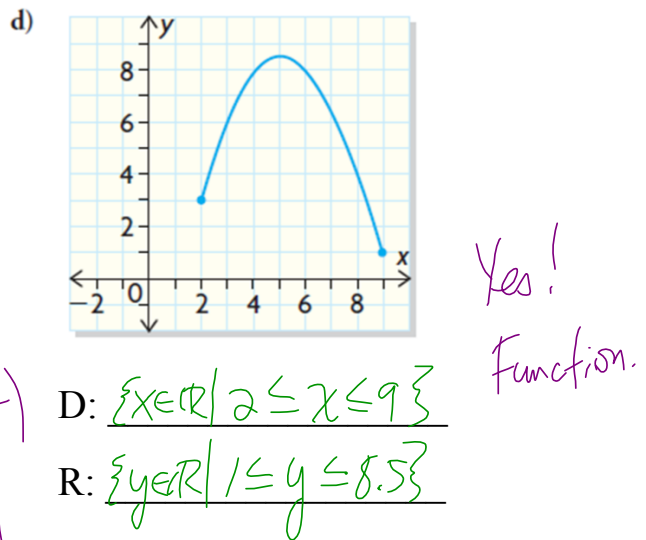
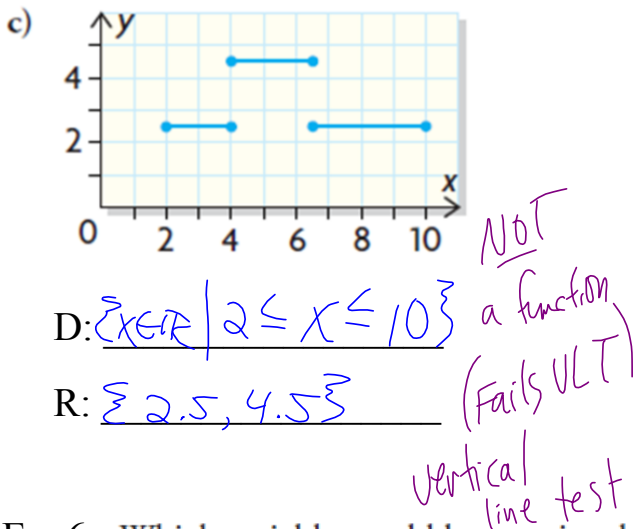
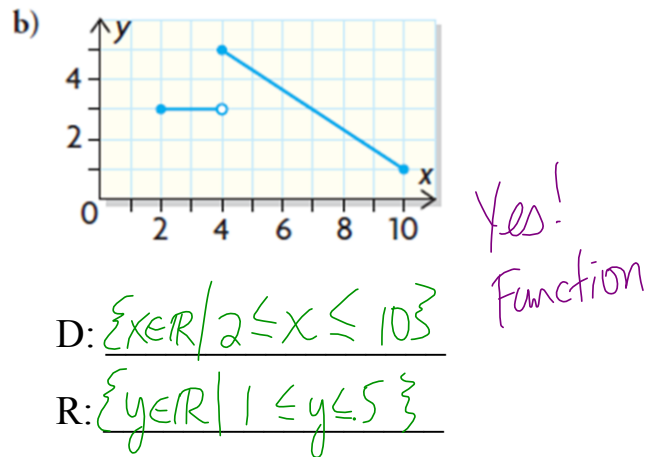
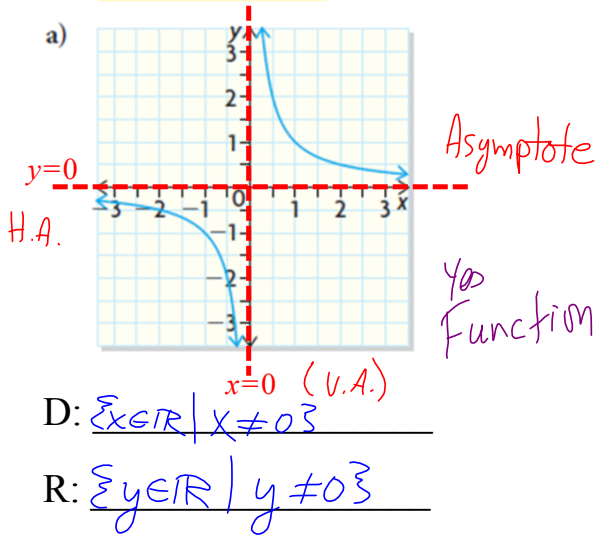


D:  $\{J, B, P\}$

R:  $\{V\}$

Yes, Function.

Ex.5: For each of the following relations, determine the domain and the range, using real numbers. State whether or not the relation is a function.



Ex. 6: Which variable would be associated with the domain for the following pairs of related quantities? Which variable would be associated with the range? Explain.

- a) heating bill, outdoor temperature *domain*
- b) report card mark, time spent doing homework *domain*
- c) number of slices of pizza, number of cuts *range* *domain*

**Range is ALWAYS the DEPENDENT VARIABLE.**

Practice: pp. 13-15 # 1-4, 7, 8, 11

