

Chapter 4: Functions
Section 4.1 Notes

What is a function?

- It is a relation that assigns each x-value (Domain) with exactly one y-value (Range)
- $f(x)$ is the value of the function of x
Remember $f(x)$ represents y
- "f" is the name of the function

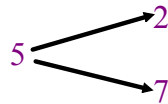
RELATION is a correspondence or a set of ordered pairs

$\{(2,1), (3,4), (6,4), (7,7)\}$

This relation is a function because each x-value corresponds to exactly one y-value.

$\{(1,3), (5,2), (5,7), (7,5)\}$

This relation is NOT a function because the x-value 5 corresponds to more than one y-value.



Notation

- Function f is a set of ordered pairs (x,y) where x is an element of the domain and y is the corresponding element in the range
- Written as $y = f(x)$

Using different letters

- $v = g(u)$ means the function is a set of ordered pairs (u, v)
- Name of function is "g"
- u-values are the domain and v-values are the range



Examples

Determine the domain of the function.

1) $h(x) = \frac{5}{x-9}$

Den $\neq 0$

$$\begin{aligned} x-9 &\neq 0 \\ +9 &+9 \\ x &\neq 9 \end{aligned}$$

$$\{x \mid \mathbb{R} \ x \neq 9\}$$

2) $m(t) = \sqrt{2t-3}$

$$2t-3 \geq 0$$

$$\frac{2t}{2} \geq \frac{3}{2}$$

$$t \geq \frac{3}{2}$$

$$\{t \mid t \geq \frac{3}{2}\}$$

3) $h(x) = \sqrt{x^2-4}$

$$x^2-4 \geq 0$$

$$(x+2)(x-2) \geq 0$$



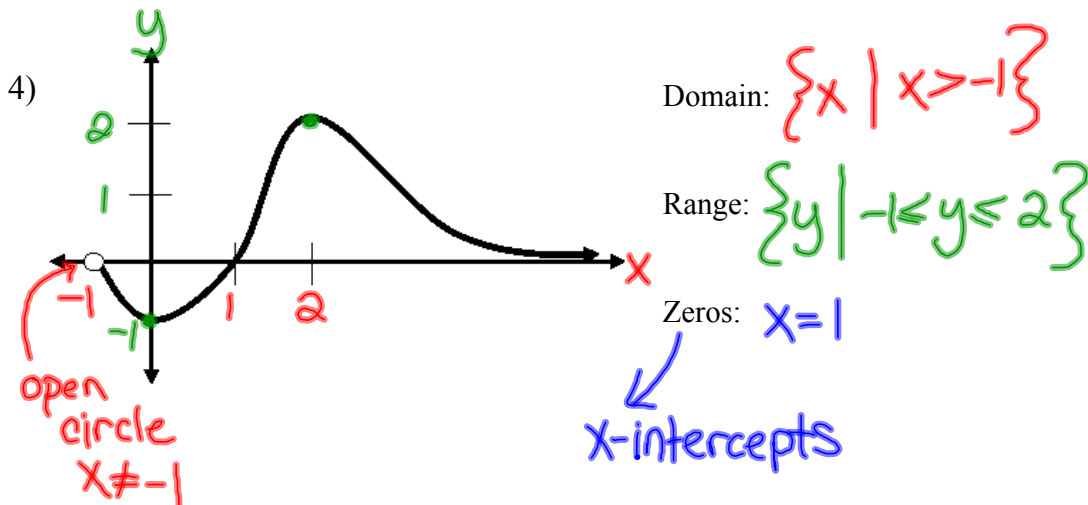
$$\{x \mid x \leq -2 \text{ OR } x \geq 2\}$$

Examples 4, 5, and 6

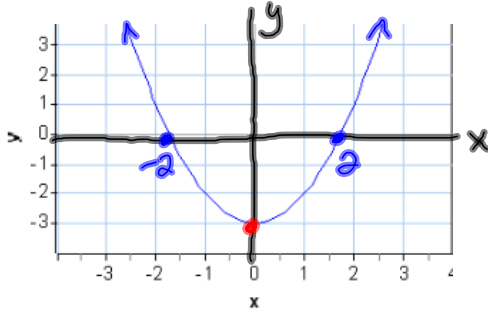
Use the graph to determine the domain, range, and zeros.

Domain - find by projecting graph onto the x-axis.

Range - find by projecting the graph onto the y-axis



5) Quadratic Equation - parabola



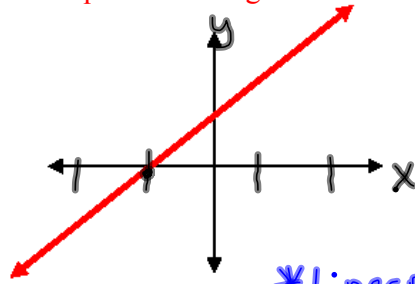
Domain always $\{x | \mathbb{R}\}$

$\{y | y \geq -3\}$

* Range \rightarrow locate vertex

Zeros $x = \pm 2$

6) Linear Equation - straight line



$\{x | \mathbb{R}\}$
 $\{y | \mathbb{R}\}$

* Linear equation Always \mathbb{R}

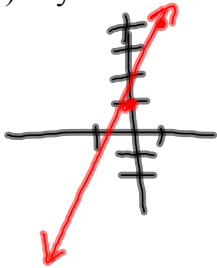
Zeros $x = -1$

* When $y = 0$

Examples

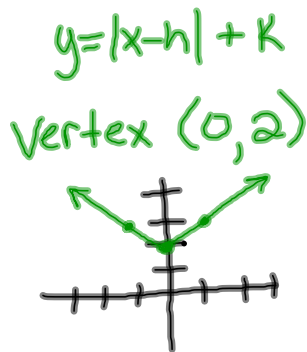
Are the following relations described by an equation a function?

7) $y = 3x + 1$



yes-function

8) $y = |x| + 2$

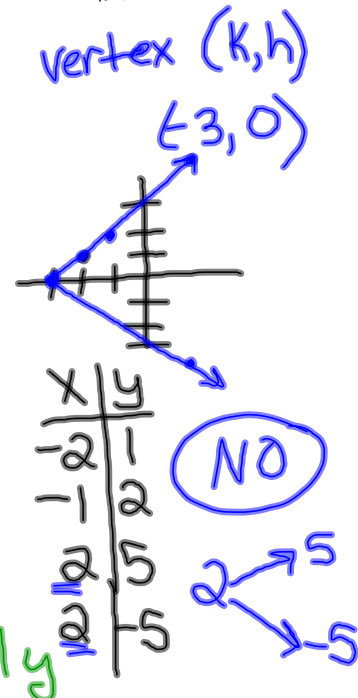


x	y
1	3
-1	3

yes

* each x corresponds to 1 y

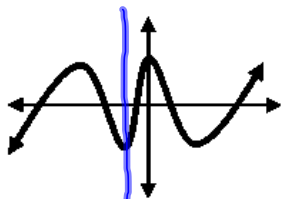
9) $x = |y| - 3$



Example 10

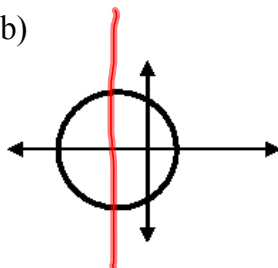
Are the following graphs functions?

a)



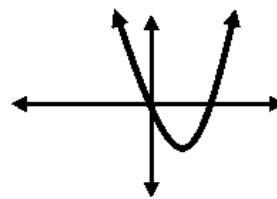
function
Passes VLT
(vertical
line test)

b)



Not A
Function
Fails VLT

c)



Function
Passes VLT

Homework

p122

#1 - 11 (skip 8)

#13, 15, 17

Write down the problem not just the answer!