Algebra III
Chapter 4 Note Packet

Name KEY

Section 4.1: Functions

Essential Question: ① What is a function?

② How do you find domain & range of a graph?

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(x) = y

- "f" is the name of the function

RELATION: is a correspondence or a set of ordered pairs (x, y)

{(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 on yevalue.

$x = 5 \rightarrow y = 2$
$\rightarrow y = 7$

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 VARIABLES

- 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

↑ what you plug into the function

↑ what you get out of the function

Examples

Determine the domain of the function.

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

Den $\neq 0$ $x - 9 \neq 0$
$x \neq 9$

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

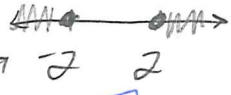
2) $m(t) = \sqrt{2t-3}$

$2t - 3 \geq 0$
$2t \geq 3$
$t \geq 3/2$

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

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

$x^2 - 4 \geq 0$
$(x-2)(x+2) \geq 0$
$=2 \quad =-2$

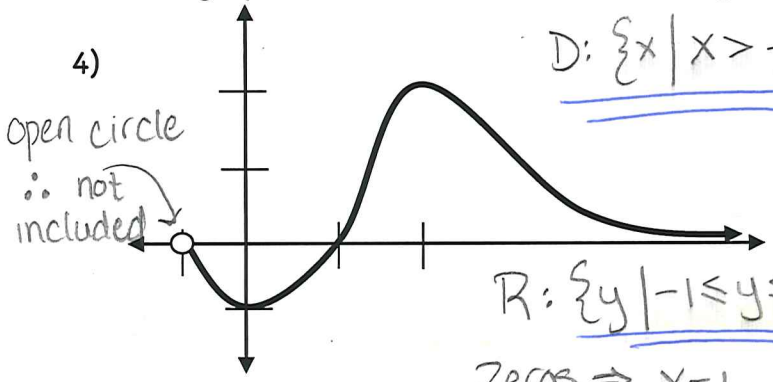


$\{x \mid x \leq -2 \text{ or } x \geq 2\}$

Examples #4 – 6

Use the graph to determine the domain, range, and zeros for #4 – 6. → x-intercepts

4)



open circle ∴ not included

D: $\{x \mid x > -1\}$

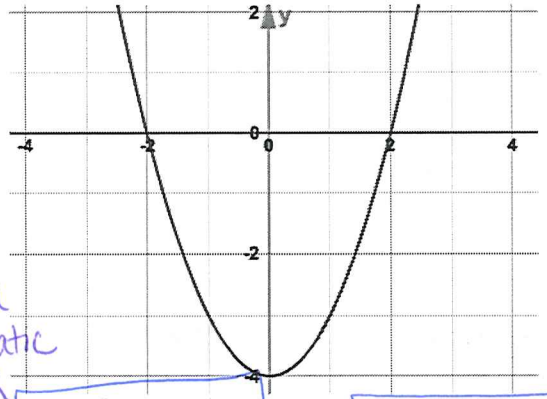
Domain: find by projecting... graph onto the x-axis

R: $\{y \mid -1 \le y \le 2\}$

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

zeros ⇒ $x = 1$

5)



*Domain of quadratic always ℝ

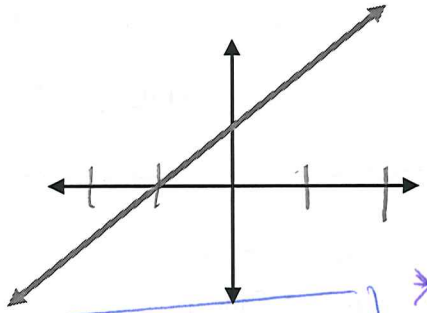
*Range locate vertex

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

R: $\{y \mid y \ge -4\}$

zeros: $x = \pm 2$

6)



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

R: $\{y \mid \mathbb{R}\}$

zeros: $x = -1$

*Linear equation Domain & Range Always ℝ

→ for linear set = 0 and solve

Examples #7 – 9

Are the following relations described by an equation a function?

7) $y = 3x + 1$

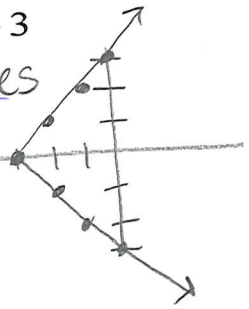
yes, every linear is a function

8) $y = |x| + 2$

yes, absolute values are functions

9) $x = |y| - 3$ (x and y interchanged)

NO, x-values correspond to two y-values



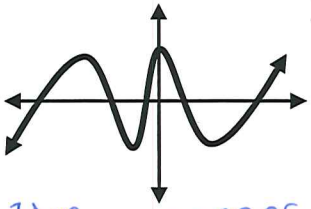
*every x corresponds to one y

Example 10

Are the following graphs functions?

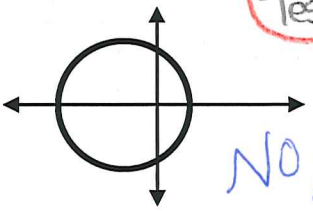
yes or NO? → check Vertical Line Test

a)



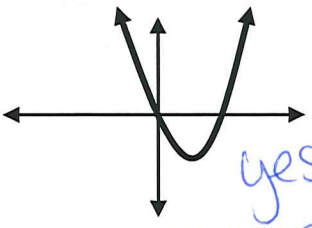
yes, passes Vertical Line test (VLT)

b)



NO, fails VLT

c)



yes, passes VLT

Section 4.1 Summary:

① A function is a set of ordered pairs in which every x-value corresponds to only one y-value. Thus, the graph of a function will pass the vertical line test (VLT).

② The domain of a function is the projection of the graph on the x-axis.

The range of a function is the projection of the graph on the y-axis.