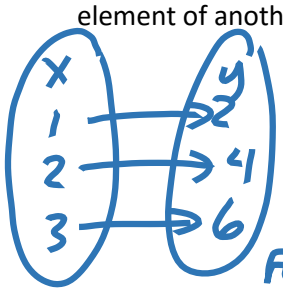
4.1 Functions

HW p.122 #1 – 19,21,25

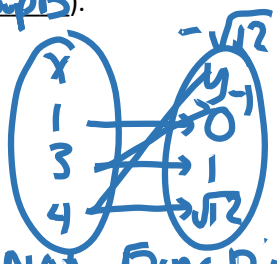
Function: a special relation that assigns each member of one set (X or group A) to EXACTLY ONE element of another set (Y or Group B).

1.

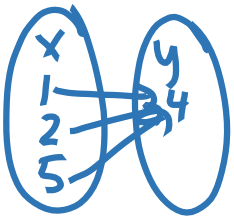


y = 2x

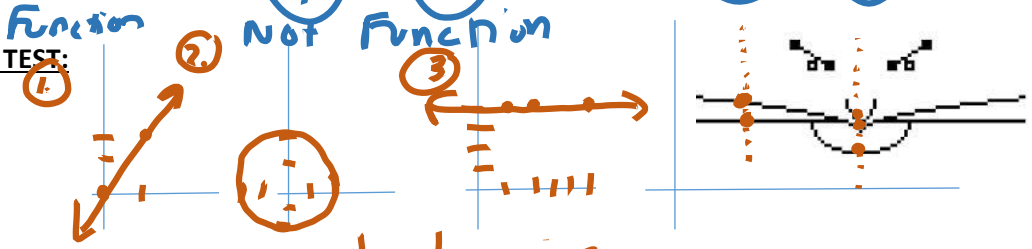
2)



3)

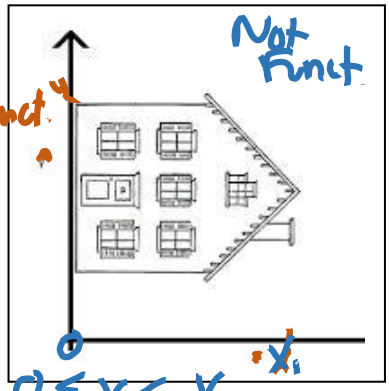


VERTICAL LINE TEST:



Relation: a correspondence or set of ordered pairs

- Can be a set of ordered pairs of an equation or a graph
- Can be a function or NOT a function. Ex. $y = \pm\sqrt{x}$



D: $0 \le x \le x_1$

R: $0 \le y \le y_1$

Domain: The set of x-values (inputs) over which a function is defined

Range: The set of y-values (outputs) that result when applying or plugging in x-values.

Time for a quick VIDEO!

1. List domain, range, zeroes, and sketch the graph.

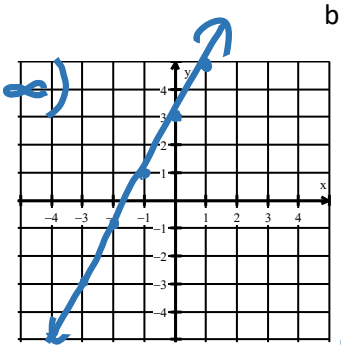
a) $f(x) = 2x + 3$

D: $\mathbb{R}$ $(-\infty, \infty)$

R: $\mathbb{R}$

$0 = 2x + 3$

$x = -\frac{3}{2}$



b) $f(x) = \frac{1}{x-2}$

Any restrictions on the domain (Values of x that make the function undefined?)

D: $\{x \mid x \neq 2\}$

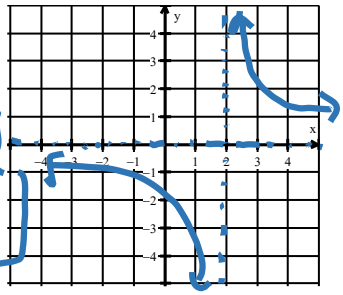
R: $\{f(x) \mid f(x) \neq 0\}$

$0 = \frac{1}{x-2}$

$(x-2)0 = 1$

$0 \neq 1$

No zeros



c) $f(x) = \sqrt{5 - x}$

$5 - x \geq 0$

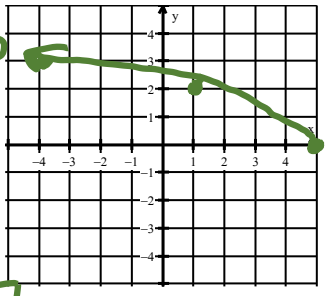
$5 \geq x$

D: $x \leq 5$

$(-\infty, 5]$

R: $f(x) \geq 0$

Zero: 5



d) $f(x) = \sqrt{1 - x^2}$

D: $-1 \leq x \leq 1$

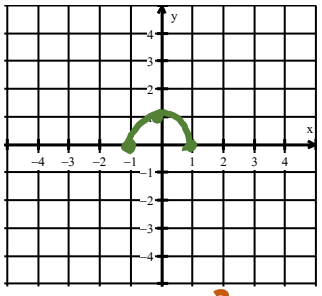
R: $0 \leq f(x) \leq 1$

$0^2 = \sqrt{1 - x^2}^2$

$0 = 1 - x^2$

$1 = x^2$

$x = \pm 1$



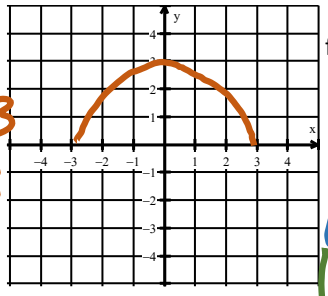
$1 - x^2 \geq 0$ + Px

$1 \geq x^2$

$-1 \leq x \leq 1$

4.1 Functions

0e) $f(x) = \sqrt{9 - x^2}$



D: $-3 \le x \le 3$

R: $0 \le f(y) \le 3$

$x = \pm 3$

f) $f(x) = \frac{1}{\sqrt{x^2-4}}$

$x^2 \neq 4$

$x \neq \pm 2$

$0 = \frac{1}{\sqrt{x^2-4}}$

$0 \neq 1$

Z: None

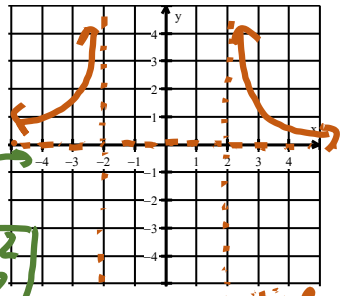
R: $f(x) > 0$

$x^2 - 4 > 0$

$x^2 > 4$

$\pm 2 \quad \pm 2$

D: $x < -2$ or $x > 2$



What X's can I plug in and get a positive result?

g) $f(t) = \frac{1}{t^2+2t-24}$

$\frac{1}{(x+6)(x-4)}$

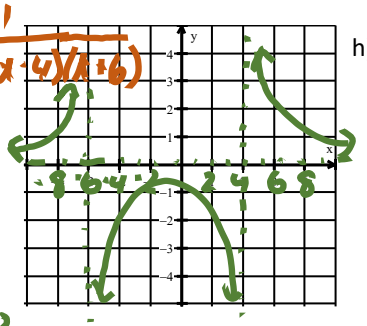
$0 = \frac{1}{x^2+2x-24}$

$0 \neq 1$

Z: None

D: $\{x \mid x \neq 4, -6\}$

R: $\{f(x) \mid f(x) < 0\}$

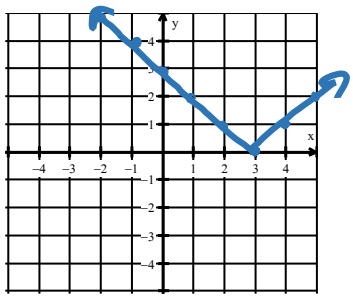


h) $f(x) = |x - 3|$

Z: 3

D: $\mathbb{R}$

R: $f(x) \ge 0$

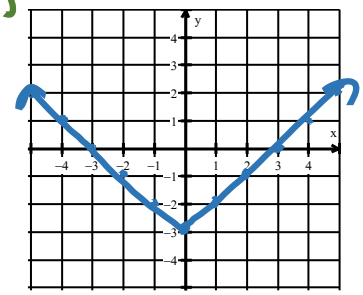


i) $f(x) = |x| - 3$

Z: $-3, 3$

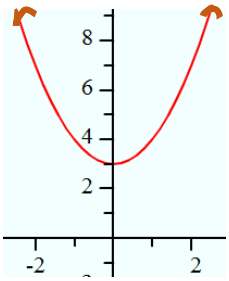
D: $\mathbb{R}$

R: $f(x) \ge -3$



2. List the domain and range of each function.

a)

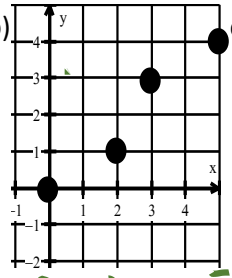


D: $\mathbb{R}$

R: $f(x) \ge 3$

Z: None

b)

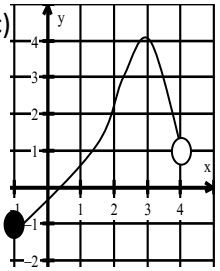


D: 0, 2, 3, 5

R: 0, 1, 3, 4

Z: 0

c)



D: $-1 \le x < 4$

$[-1, 4)$

R: $-1 \le f(x) \le 4$

$[-1, 4]$

Z: $\frac{1}{3}$

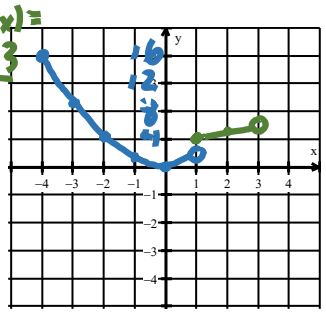
Piecewise Functions (It's like a puzzle!!! Right?)

3. a) $f(x) = \begin{cases} x^2 & \text{if } -4 \le x < 1 \\ x + 3 & \text{if } 1 \le x < 3 \end{cases}$

x	$f(x) = x^2$
-4	16
-3	9
-2	4
-1	1
0	0
1	1

x	$f(x) = x + 3$
1	4
2	5
3	6

Open Circle

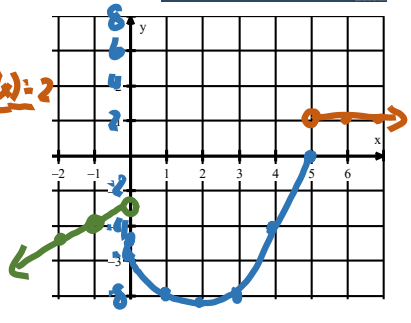


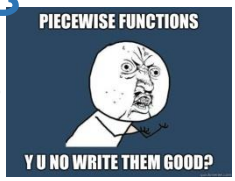
b) $f(x) = \begin{cases} x - 3 & \text{if } x < 0 \\ x^2 - 4x - 5 & \text{if } 0 \le x \le 5 \\ 2 & \text{if } x > 5 \end{cases}$

x	$y = x - 3$
0	-3
-1	-4
-2	-5
-3	-6

x	$y = x^2 - 4x - 5$
0	-5
1	-8
2	-9
3	-8
4	-5
5	0

x	$f(x) = 2$
5	2
6	2
7	2

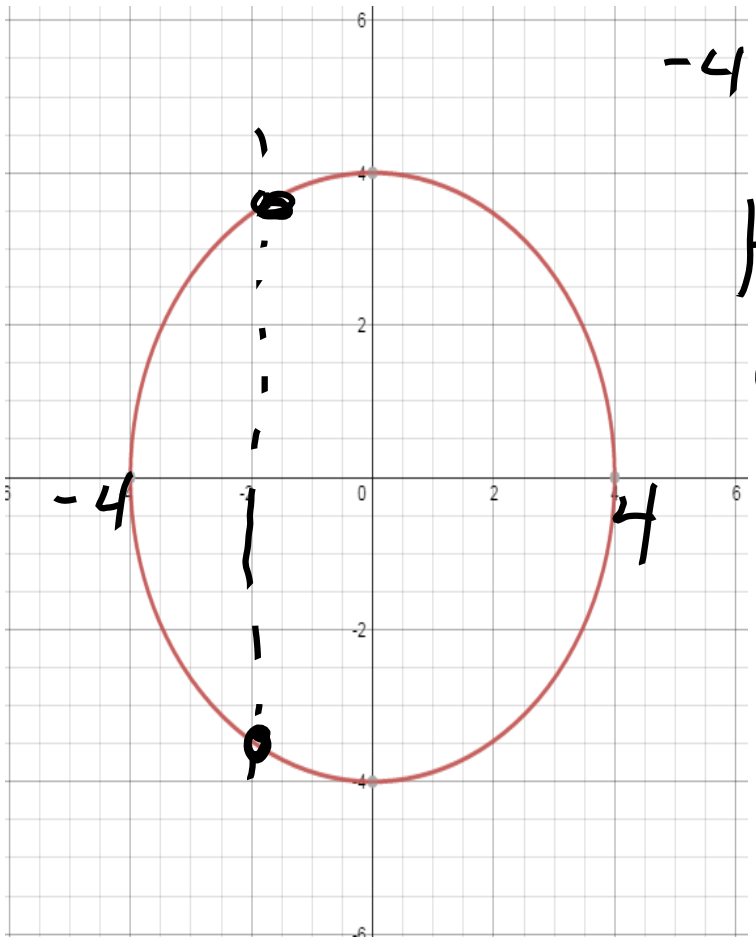




4.1 Functions

Warm-Up

Find the domain



$-4 \leq x \leq 4$

HW
due Fri