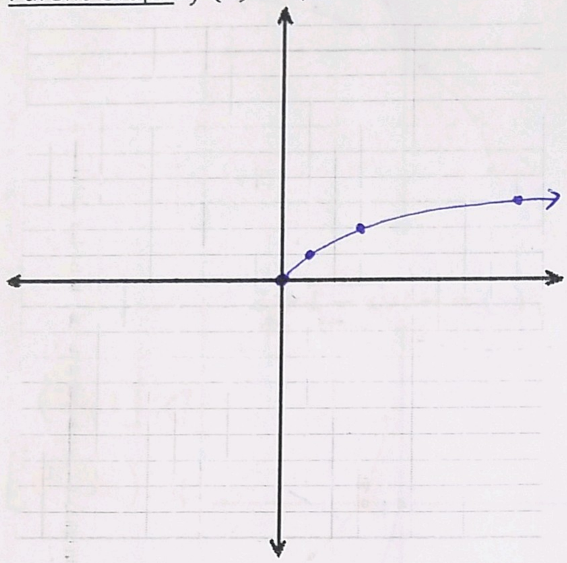
Arroyo P.6 2/28/22

A51: Graphs of Square Root Functions

25.1 Square Root Functions

Parent Graph: $f(x) = \sqrt{x}$



☆ The input of a square root can never be negative ☆

x	y
0	0
1	1
4	2
9	3
16	4
25	5

$f(x) = \sqrt{x}$ has the points:

(0 , 0) (1 , 1) (4 , 2) (9 , 3)

Square Root Transformations

- negative: reflects over x-axis
- $|a| > 1$ vertical stretch
- $|a| < 1$ vertical shrink

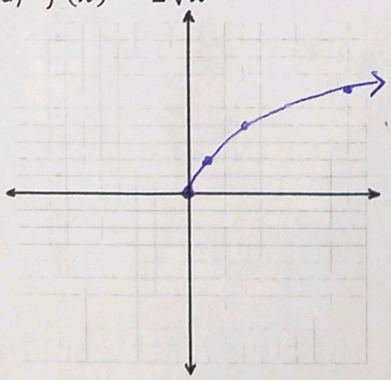
} mult. y-values by "a"

$$f(x) = a\sqrt{x - c} + d$$

- $+d$ up
- $-d$ down
- $+c$ left
- $-c$ right

Ex #1: Graph the function, then state the domain and range.

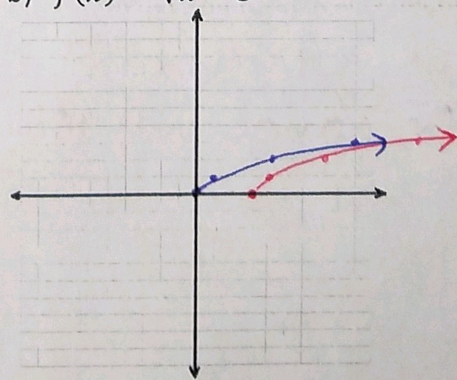
a) $f(x) = 2\sqrt{x}$



D: $[0, \infty)$

R: $[0, \infty)$

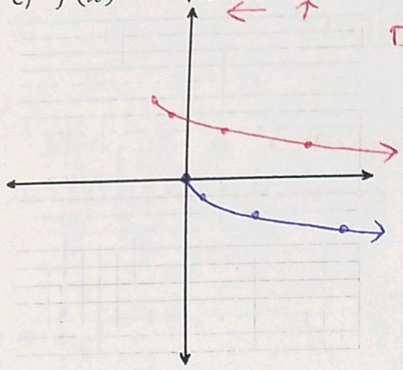
b) $f(x) = \sqrt{x - 3}$



D: $[3, \infty)$

R: $[0, \infty)$

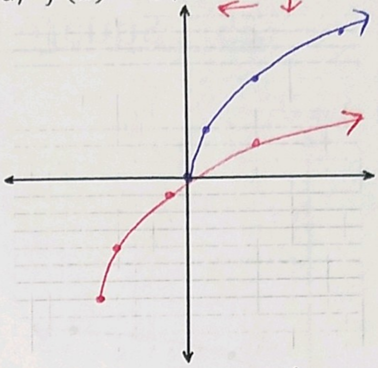
c) $f(x) = -\sqrt{x+2}+5$



D: $[-2, \infty)$

R: $(-\infty, 5]$

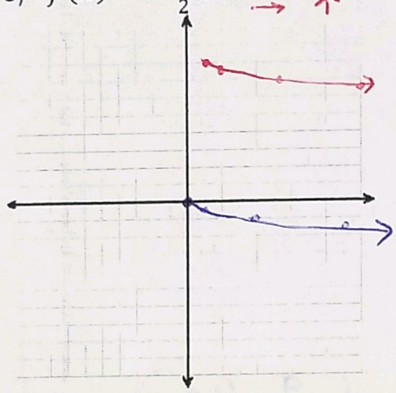
d) $f(x) = 3\sqrt{x+5}-7$



D: $[-5, \infty)$

R: $[-7, \infty)$

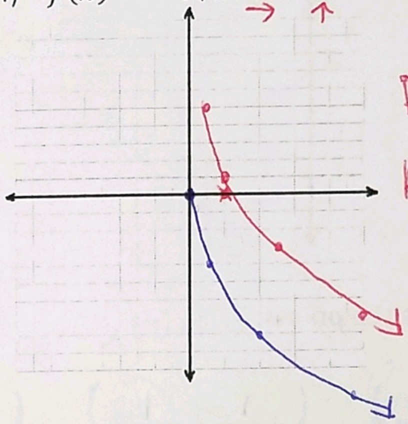
e) $f(x) = -\frac{1}{2}\sqrt{x-1}+8$



D: $[1, \infty)$

R: $(-\infty, 8]$

f) $f(x) = -4\sqrt{x-1}+5$



D: $[1, \infty)$

R: $(-\infty, 5]$

Key Features of Square Root Graphs

How is the horizontal translation (left/right) related to the domain?

The horizontal translation gives us the start of the domain.

How is the vertical translation (up/down) related to the range?

The vertical translation gives us the start or end of the range.

What will a vertical reflection do to the domain and range?

A vertical reflection will do nothing to the domain, but the range will start at $-\infty$.