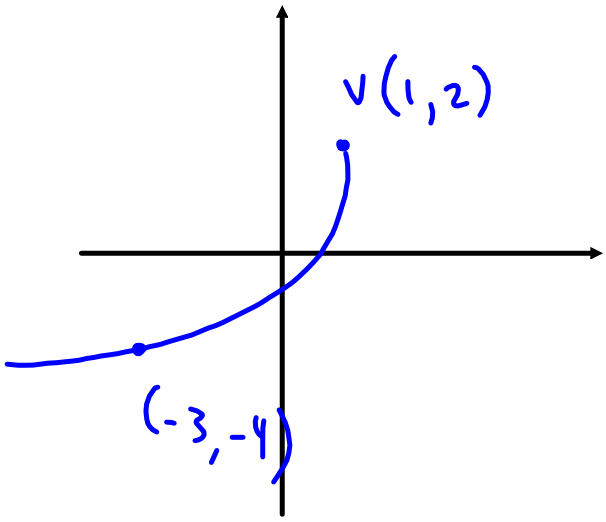
Rule of a Square Root Function

Goal:

- to determine the equation (rule) for any square r oot function

A square root function passes through the point (-3,-4), has a max=2 and has a domain of $]-\infty,1]$. Find the rule for the function.



$f(x)=a\sqrt{b(x-h)}+k$

$f(x)=a\sqrt{b(x-1)}+2$

$b=-1$

$f(x)=a\sqrt{-(x-1)}+2$

$-4=a\sqrt{-(-3-1)}+2$

$-6=a\sqrt{4}$

$-6=2a$

$a=-3$

$f(x)=-3\sqrt{-(x-1)}+2$

We have seen that the rule of any square root function can be written as:

$$f(x) = a\sqrt{b(x-h)} + k$$

However, when finding the rule we can simplify things a little. Instead we will use the following form:

$$f(x) = a\sqrt{\pm(x-h)} + k$$

* set "b" equal to +1 or -1

Why is this possible?

PROPERTIES OF RADICALS

$$\sqrt{ab} = \sqrt{a}\sqrt{b}$$

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

$= \sqrt{4}\sqrt{x-2} + 1$

$= 2\sqrt{x-2} + 1$

$f(x) = -\sqrt{-9x+27} + 6$

$= -\sqrt{-9(x-3)} + 6$

$= -\sqrt{9}\sqrt{-(x-3)} + 6$

$= -3\sqrt{-(x-3)} + 6$

$f(x) = 4\sqrt{3x+5} - 2$

$= 4\sqrt{3(x+\frac{5}{3})} - 2$

$= 4\sqrt{3}\sqrt{x+\frac{5}{3}} - 2$

these examples show it is possible to write sq. root functions with b=+1 or b=-1

This means that the parameters to be found are...

a, h, k

since b=+1 or b=-1

This is can be accomplished given the vertex and one other ordered pair belonging to the function.

p. 43 # 9, 11, 12

Steps:

1. Determine whether $b=+1$ or $b=-1$

2. Find vertex

3. Substitute ordered pair to solve for "a"

4. Write the rule

p. 42

13. c) $y = -0.4\sqrt{0.3 - x} - 0.16$ $\quad y = 6$

$$6 = -0.4\sqrt{0.3 - x} - 0.16$$

$+0.16 \qquad +0.16$

$$\frac{6.16}{-0.4} = \frac{-0.4\sqrt{0.3 - x}}{-0.4}$$

$$-15.4 = \sqrt{0.3 - x}$$

$\emptyset$

p. 42

#14. a) $f(x) = -7\sqrt{x-12} + 18$ $\quad f(x) < 4$

dom f: $x - 12 \geq 0$

$x \geq 12$

$-7\sqrt{x-12} + 18 < 4$

$\frac{-7\sqrt{x-12}}{-7} < \frac{-14}{-7}$

$\sqrt{x-12} > -1$

$\left(\sqrt{x-12}\right)^2 > 2^2$

$x - 12 > 4$

$x > 16$ ✓

$x - 12 > 1$

$x > 13$