

## Lesson 2.2 Square Root of a Function

### Lesson 2.2: Square Root of a Function

↳ Given the graph of  $y = f(x)$ , sketch the graph of  $y = \sqrt{f(x)}$

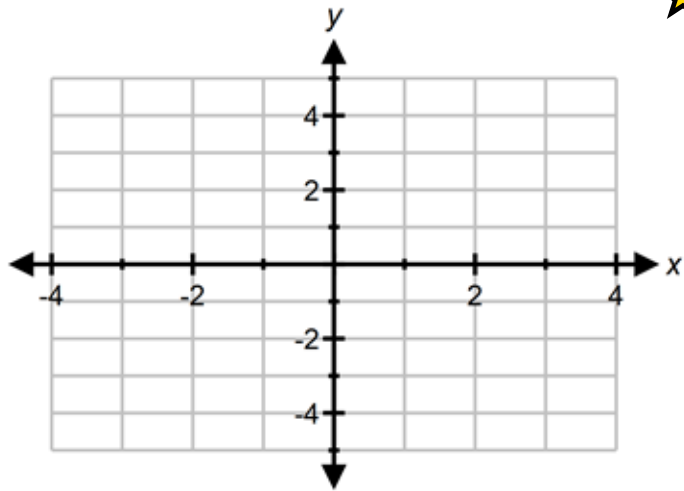
focus on linear and quadratic functions

#### Example 1 (Linear Function)

Given  $f(x) = -2x + 3$ , graph the functions  $y = f(x)$  and  $y = \sqrt{f(x)}$ .

#### Method 1: Use a table of values

$x$	$f(x)$	$\sqrt{f(x)}$
2		
★ 1.5		
1.3		
★ 1		
0		
-1		
-2		



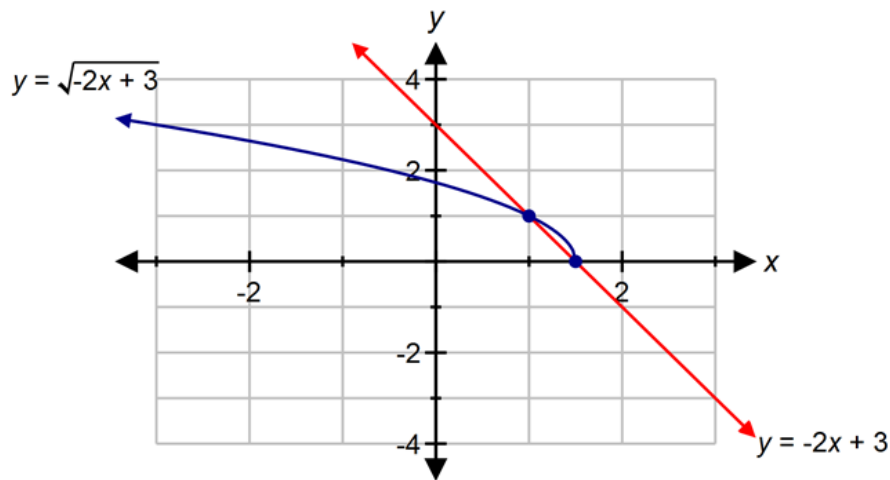
(i) Why is the graph of  $y = \sqrt{f(x)}$  undefined when  $x > 1.5$ ?

(ii) Determine the domain and range of  $y = \sqrt{f(x)}$  algebraically?

Domain:

Range:

## Method 2: Use Invariant Points



(i) Determine the invariant points.

↳ Invariant points occur when  $f(x) = 0$  or  $f(x) = 1$  because at these values  $\sqrt{f(x)} = f(x)$

(ii) How do the graphs of  $y = f(x)$  and  $y = \sqrt{f(x)}$  compare on either side of the invariant points?

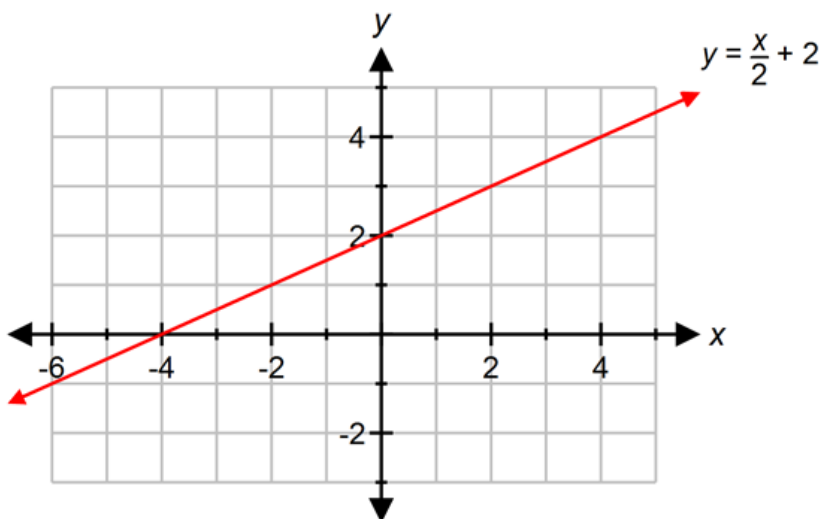
↳ The graph of  $y = \sqrt{f(x)}$  is above the graph of  $y = f(x)$  for values of  $y$  between 0 and 1?

→

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### Example 2

Using the graph of  $f(x)$ , sketch the graph of  $y = \sqrt{f(x)}$ . Label the invariant points and determine the domain and range of  $y = \sqrt{f(x)}$ .



Invariant Points

Domain

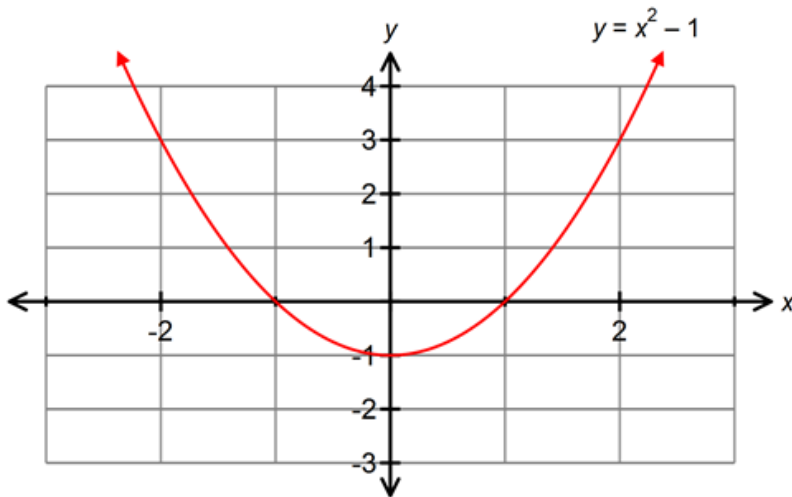
Range

Assign p.87 #4, 5ac, 8a

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### Example 3 (Quadratic Function)

Given the graph of  $y = x^2 - 1$  below, sketch the graph of  $y = \sqrt{x^2 - 1}$  by examining the intercepts and invariant points.



(i) Graph of  $y = x^2 - 1$

└─ intercepts  
    vertex

(ii) Determine the invariant points

(iii) Why is the graph undefined from  $x \in (-1, 1)$ ?

(iv) State the domain and range of  $y = \sqrt{f(x)}$ .

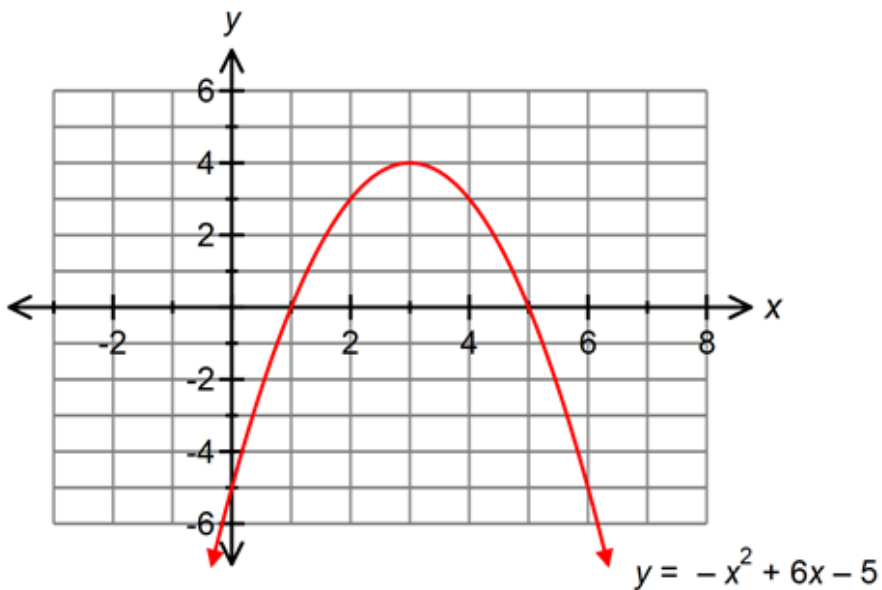
Domain

Range

## Lesson 2.2 Square Root of a Function

### Example 4

Given  $y = -x^2 + 6x - 5$ , sketch the graph of  $y = \sqrt{f(x)}$ .



(i) Graph of  $y = -x^2 + 6x - 5$

└─ intercepts  
    vertex

(ii) Determine the invariant points

(iii) State the domain and range of  $y = \sqrt{f(x)}$ .

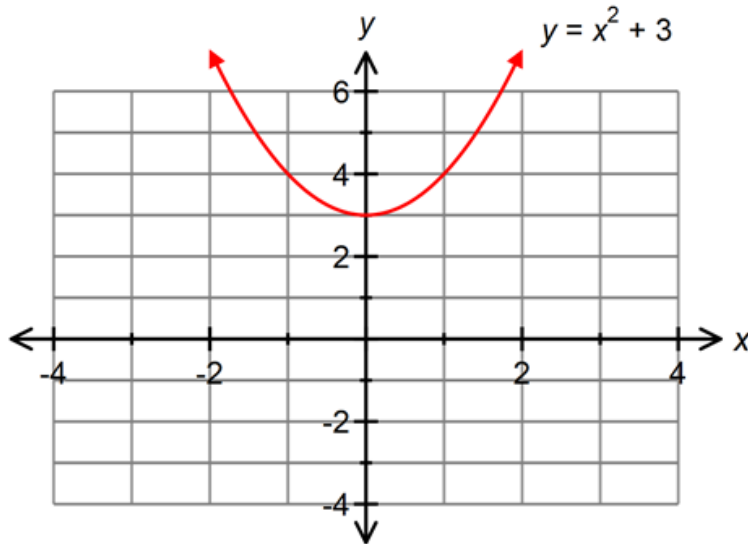
Domain

Range

## Lesson 2.2 Square Root of a Function

### Example 5

Given  $y = x^2 + 3$ , sketch the graph of  $y = \sqrt{f(x)}$  and determine the domain and range.



(i) Graph of  $y = x^2 + 3$

└─ intercepts  
    vertex

(ii) Determine the invariant points

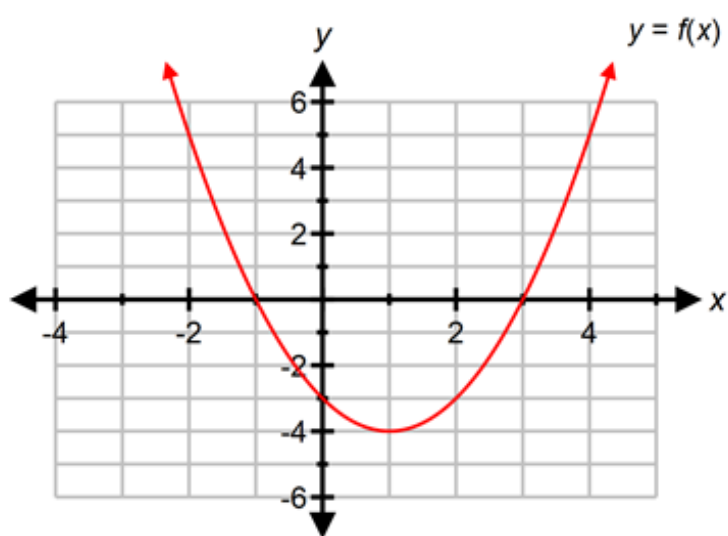
(iii) State the domain and range of  $y = \sqrt{f(x)}$ .

Domain

Range

Your Turn

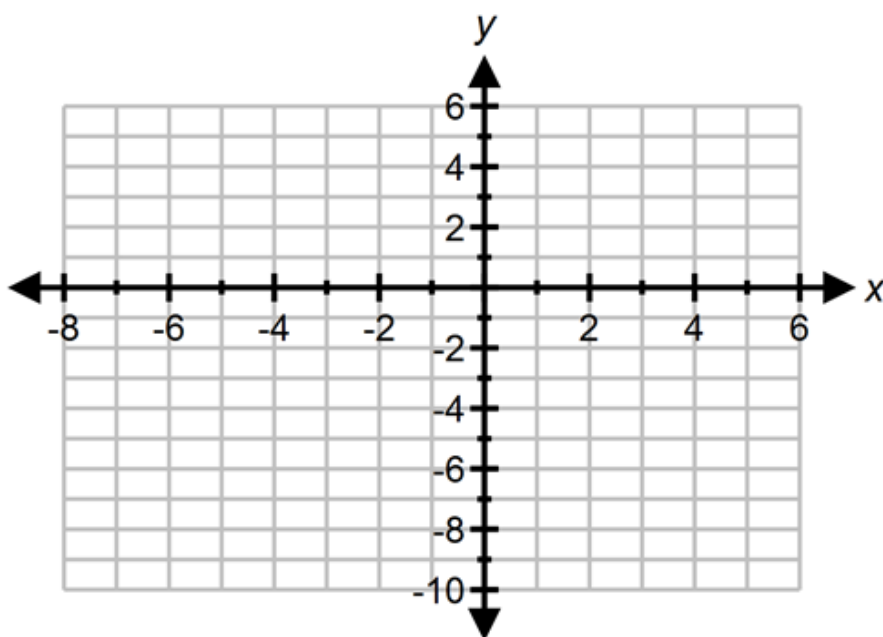
Using the graph of  $y = f(x)$ , sketch the graph of  $y = \sqrt{f(x)}$  and state the domain and range of each function.



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### Your Turn

- (i) Given  $f(x) = x^2 + 4x - 5$ , determine the domain and range for  $y = \sqrt{f(x)}$ .



Domain

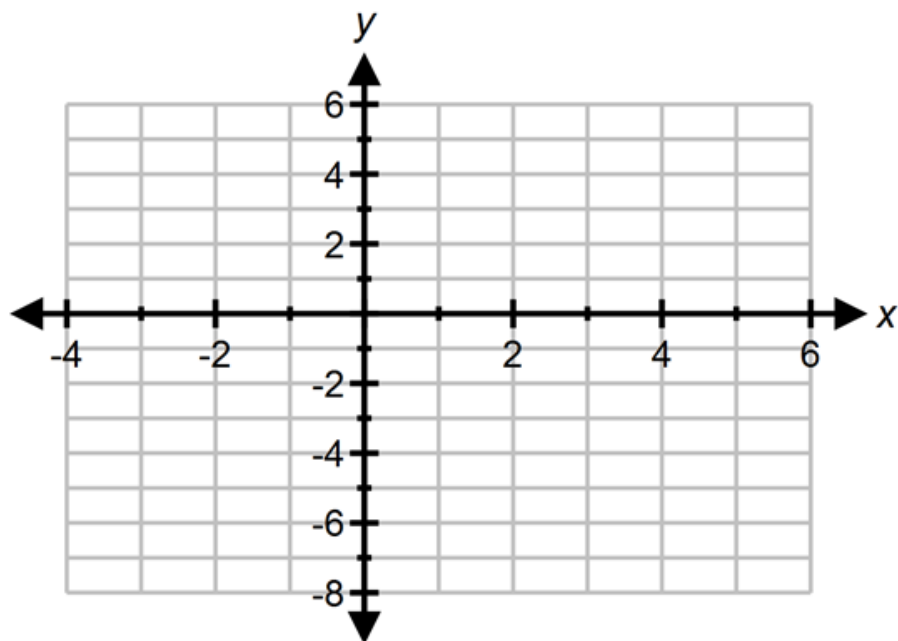
Range



Your Turn 

(ii) Determine the domain and range for  $y = \sqrt{f(x)}$  .

$$\text{if } f(x) = -\frac{3}{2}x^2 + 3x + \frac{9}{2}$$



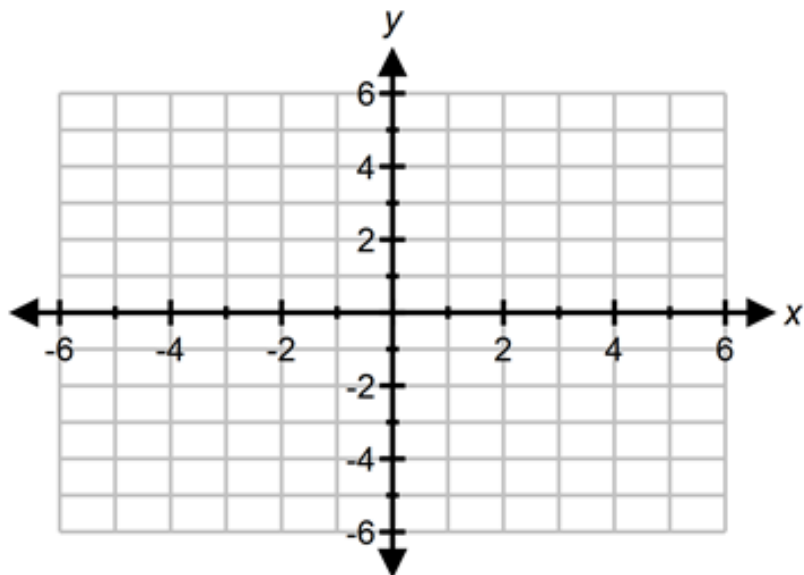
Domain

Range



Your Turn 

(iii) Given  $f(x) = x^2 + 4$ , determine the domain and range for  $y = \sqrt{f(x)}$ .



Domain

Range

Assign P.86-87 #3, 8c, 10, 11