

41)  $2x + ky = 3$      $x + y = 1$   
 $\frac{ky}{k} = \frac{-2x+3}{k}$      $y = -x+1$   
 $y =$      $m = -1$   
 $\frac{-a}{k} = -1$   
 $k = 2$

Sep 8-10:27 AM

## 1-2 Function Analysis

**Learning Objectives:**

- I can find the domain and range of a function.
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Sep 4-9:20 AM

**Parabolas**  
 $y = a(x - h)^2 + k$   
 if  $a > 0$  U  
 if  $a < 0$   $\cap$   
 $0 < |a| < 1$  wider  
 $|a| > 1$  narrower  
 How does  $y = 3x^2$  compare to the parent graph of  $y = x^2$ ? **narrowed**

**vertex form**  $\rightarrow (h, k)$   
 if  $h = 0$ , right  
 if  $h < 0$ , left  
 if  $k > 0$ , up  
 if  $k < 0$ , down

How does each change compare to the parent graph?  
 a)  $y = (x - 2)^2$  Moved right 2  
 b)  $y = 1/2x^2 + 5$  up 5, wider  
 c)  $y = -2(x - 4)^2 - 3$  flipped, right 4, down 3, narrower

Mar 29-10:33 AM

### Families of Graphs (Parent Graphs)

①  $y = x$      $D: \mathbb{R}$      $R: \mathbb{R}$   
 $y = a(x-h) + k$

②  $y = x^2$      $D: \mathbb{R}$      $R: y \geq 0$   
 $y = a(x-h)^2 + k$

③  $y = x^3$      $D: \mathbb{R}$      $R: \mathbb{R}$   
 $y = a(x-h)^3 + k$

④  $y = \sqrt{x}$      $D: x \geq 0$      $R: y \geq 0$   
 $y = a\sqrt{x-h} + k$

⑤  $y = |x|$      $D: \mathbb{R}$      $R: y \geq 0$   
 $y = a|x-h| + k$

⑥  $y = [x]$      $D: \mathbb{R}$      $R: \text{all integers}$   
 $y = a[x-h] + k$

⑦  $y = \frac{1}{x}$      $D: x > 0$  or  $x < 0$      $R: y > 0$  or  $y < 0$   
 $y = \frac{a}{x-h} + k$

Mar 29-10:32 AM

Ex2. Graph each function. Identify the domain and range.

- $y = x^2$
- $y = \frac{1}{x}$
- $y = \sqrt{x-3}$

Aug 31-2:06 PM

4.  $y = -2|x-3| + 1$

3)  $y = \sqrt{x-3}$

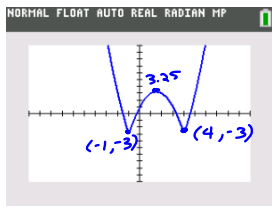
5.  $y = \begin{cases} x^2 & \text{if } x \leq 1 \\ 1/2x + 3/2 & \text{if } -1 \leq x < 1 \\ \sqrt{x+1} & \text{if } x \geq 1 \end{cases}$

Handwritten notes include:  
 - A table for  $y = x^2$  with points (-3, 9), (-2, 4), (-1, 1).  
 - A table for  $y = 1/2x + 3/2$  with points (-1, 1), (1, 2).  
 - A table for  $y = \sqrt{x+1}$  with points (0, 1), (3, 2).  
 - Domain and range for the square root function:  $D: x \geq 3$ ,  $R: y \geq 0$ .

Aug 31-2:06 PM

Use a graphing calculator to find the domain and range and important points (maxima, minima, intercepts):

$$y = |x^2 - 3x - 4| - 3$$



D:  $\mathbb{R}$   
 R:  $y \geq -3$   $[-3, \infty)$   
 -1.541 }  
 -0.303 } x-int.  
 3.303 }  
 4.541 }  
 y-int.  $\rightarrow$  1  
 min -3

Sep 8-12:16 PM

## Composite of Functions

$$f(x) = x^2$$

$$g(x) = x - 5$$

$$f \circ g = f(g(x)) = (x - 5)^2$$

$$g \circ f = g(f(x)) = x^2 - 5$$

Sep 4-9:20 AM

Ex1. Given  $f(x)$  and  $g(x)$ , find  $f \circ g$

and  $g \circ f$  and state the domain and

range of each  $\frac{1}{x} - 3 \geq 0 \quad x \leq \frac{1}{3} \quad D: (0, \frac{1}{3}]$   
 $\frac{1}{x} \geq 3 \quad 1 \geq 3x \quad R: y \geq 0$

$$f(x) = \sqrt{x-3} \quad D: x \geq 3 \quad f(g(x)) = \sqrt{\left(\frac{1}{x}\right) - 3}$$

$$g(x) = \frac{1}{x} \quad D: x \neq 0 \quad g(f(x)) = \frac{1}{\sqrt{x-3}}$$

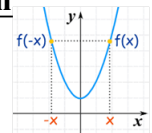
D:  $x > 3$   
 $x - y > 0$

Sep 4-9:20 AM

## Even/Odd Functions

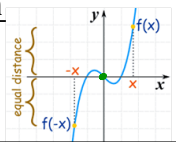
A function is an Even Function

if  $f(-x) = f(x)$  for all  $x$



A function is an Odd Function

if  $f(-x) = -f(x)$  for all  $x$



Sep 4-9:20 AM

Ex2. Decide if the given function is even, odd, or neither

1.  $f(x) = |x|$   $\checkmark$  even

2.  $g(x) = x^3 + \cos(x)$   $\checkmark$  odd

3.  $y = x^2 + 2x + 1$   $\checkmark$  neither

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## Homework

pg 19 # 6, 7, 9, 12, 16, 20, 31-34, 41, 46

pg 19 # 21 - 30, 37 - 40, 50 - 52, 56

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Power Plant

$$C(x) = \$180\sqrt{x^2 + 800^2} + \$100(10560 - x)$$

x	C(x)
1900	3000

20

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

Sep 12-1:15 PM

## Inverses

To find the inverse of a function, switch the x and y and solve for y.

Ex3. Find the inverse

$$y = f(x) = x^2 + 4x + 4$$

$$x = y^2 + 4y + 4$$

$$x = (y+2)^2$$

$$y+2 = \pm\sqrt{x}$$

$$y = -2 \pm \sqrt{x}$$

$$y = x^2 + 4x + 9$$

$$x = y^2 + 4y + 9$$

$$\frac{4}{x-9} = y^2 + 4y + \frac{4}{x-9}$$

$$x-5 = (y+2)^2$$

Sep 4-9:20 AM

Now graph  $y = f(x)$  and  $y = f^{-1}(x)$  on the same axes.

Sep 4-9:20 AM

$f(x) = x^3$   
 $f^{-1}(x) = \sqrt[3]{x}$

$f(x) = e^x$   
 $f^{-1}(x) = \ln x$

Sep 4-9:20 AM

If  $f(x)$  and  $f^{-1}(x)$  are inverses, then  $f \circ f^{-1}(x) = f^{-1} \circ f(x) = x$

$$f(f^{-1}(x)) = f^{-1}(f(x)) = x$$

For example:

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

$$(\sqrt{x})^2 = \sqrt{(x^2)} = x$$

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