

# Unit 4 Advanced Functions

## Review Day

# Warm-up!

Find the domain and range of the following functions. Then, tell how they are changed from their parent graph. (Hint: Remember that the order of transformations can be important)

1)  ~~$f(x) = 2x + 3 - 4$~~

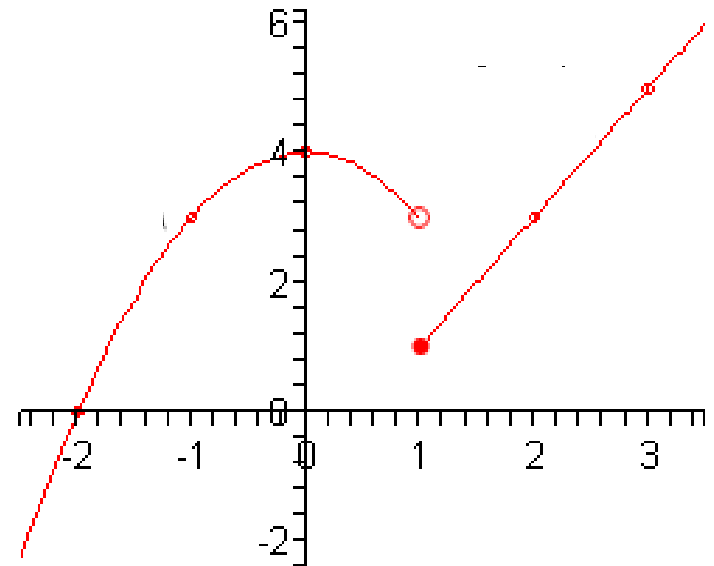
**Change #1 to this one!!**  $\rightarrow f(x) = \frac{2}{x+3} - 4$

2)  $f(x) = \sqrt[3]{8x-16} - 5$

3)  $f(x) = -\sqrt{9x+54} + 2$

4)  $f(x) = -3|x-7| + 1$

5) Write a Piecewise Function for the graph shown. Then tell its domain and range.  
(Hint: use graph paper!)



Warm-Up continues on next slide!  $\rightarrow$

# Warm-up CONTINUED!

## Released Exam problems

6. The amount of time it takes to build a road varies inversely with the number of workers building the road. Suppose it takes 50 workers 8 months to build the road. Write an equation that could be used to determine how long it would take  $n$  workers to build the road. (Be sure to define the variables. How much faster would 60 workers build the road than 50 workers?)
7. The force,  $F$ , acting on a charged object varies inversely to the square of its distance,  $r$ , from another charged object. When the two objects are 0.64 meters apart, the force acting on them is 8.2 Newtons. *Approximately* how much force would the object feel if it is at a distance of 0.77 meters from another object? Round to the tenths place.

Warm-Up continues on next slide! →

# Warm-up CONTINUED!

Given  $f(x) = x^2 - 3x + 2$ , find

8.  $f(x - 4)$

9.  $f(x + 2) - 3f(x)$

# Warm-Up Solutions

Find the domain and range of the following functions. Then, tell how they are changed from their parent graph. (Hint: Remember that the order of transformations can be important)

$$1) f(x) = \cancel{2x+3} - 4$$
$$f(x) = \frac{2}{x+3} - 4$$

**Domain:**  $(-\infty, -3) \cup (-3, \infty)$

**Range:**  $(-\infty, -4) \cup (-4, \infty)$

**Vertical Stretch by 2, left 3, down 4**

$$3) f(x) = -\sqrt{9x+54} + 2$$

**Domain:**  $[-6, \infty)$

**Range:**  $(-\infty, 2]$

**Reflected over x-axis, Vertical Stretch by 3, left 6, up 2**

$$2) f(x) = \sqrt[3]{8x-16} - 5$$

**Domain:**  $(-\infty, \infty)$

**Range:**  $(-\infty, \infty)$

**Vertical Stretch by 2, right 2, down 5**

$$4) f(x) = -3|x-7| + 1$$

**Domain:**  $(-\infty, \infty)$

**Range:**  $(-\infty, 1]$

**Reflected over x-axis, Vertical Stretch by 3, right 7, up 1**

# Warm-Up

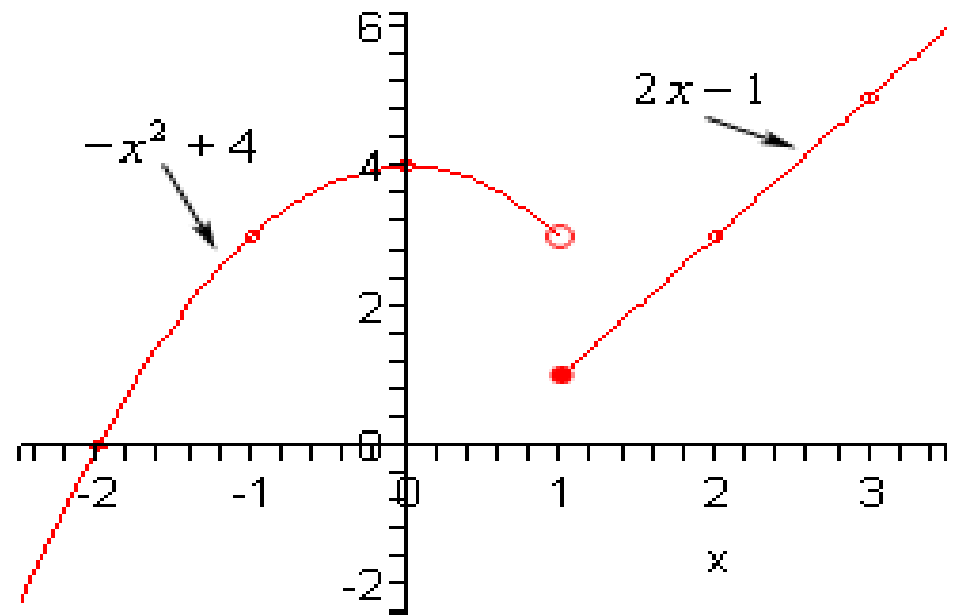
## *Solutions*

5) Write a Piecewise Function for the graph shown. Then tell its domain and range.

(Hint: use graph paper!)

**Domain:**  $(-\infty, \infty)$

**Range:**  $(-\infty, \infty)$



$$F(x) = \begin{cases} -x^2 + 4 & \text{if } x < 1 \\ 2x - 1 & \text{if } x \geq 1 \end{cases}$$

# Warm-up ANSWERS!

**Add these Released Exam problems in to your notes!!**

6. The amount of time it takes to build a road varies inversely with the number of workers building the road. Suppose it takes 50 workers 8 months to build the road. Write an equation that could be used to determine how long it would take  $n$  workers to build the road. (Be sure to define the variables. How much faster would 60 workers build the road than 50 workers?)

$t = \frac{k}{n}$  where  $t$  = time in months, and  
 $n$  = # people working to build the road

$$8 = \frac{k}{50}$$

$$400 = k$$

$$t = \frac{400}{n}$$

$$t = \frac{400}{60} = 6 \frac{2}{3} \text{ months for 60 workers}$$

$$t = 8 \text{ months} - 6 \frac{2}{3} \text{ months} = 1 \frac{1}{3} \text{ months faster!!}$$

# Warm-up CONTINUED!

**Add these Released Exam problems in to your notes!!**

**7. The force,  $F$ , acting on a charged object varies inversely to the square of its distance,  $r$ , from another charged object. When the two objects are 0.64 meters apart, the force acting on them is 8.2 Newtons.**

***Approximately* how much force would the object feel if it is at a distance of 0.77 meters from another object? Round to the tenths place.**

$F = \frac{k}{r^2}$  where  $F$  = force acting on a charged object,  
 $r$  = distance from another charged object

$$8.2 = \frac{k}{(0.64)^2}$$

$$k = (8.2) (0.64)^2 \\ = 3.35872$$

$$F = \frac{3.35872}{r^2}$$

$$F = \frac{3.35872}{(0.77)^2} = \text{Force on object at a distance 0.77 m from object}$$

$$F \sim 5.7 \text{ Newtons}$$



# Warm-up CONTINUED!

Given  $f(x) = x^2 - 3x + 2$ , find

8.  $f(x - 4)$

$$x^2 - 11x + 30$$

9.  $f(x + 2) - 3f(x)$

$$-2x^2 + 10x - 6$$

# HW Answers

(some work is shown on later slides)

$$1. v = \frac{36}{7}$$

$$2. r = \frac{-5}{4}$$

$$9. \text{ LCD: } m + 9$$

$$\text{Answer: } m = -27$$

$$3. x = 6, -3$$

$$4. x = -1$$

$$10. \text{ LCD: } (x + 4)(x - 4)$$

$$\text{Answer: } x = 11$$

$$5. n = \frac{-17}{3}$$

$$6. r = 4, -1$$

$$11. \text{ LCD: } (x - 11)(x + 6)$$

$$\text{Answer: } x = -4$$

$$7. x = \frac{36}{7}$$

$$8. a = \frac{-19}{8}$$

$$12. \text{ LCD: } (x + 7)(x + 3)$$

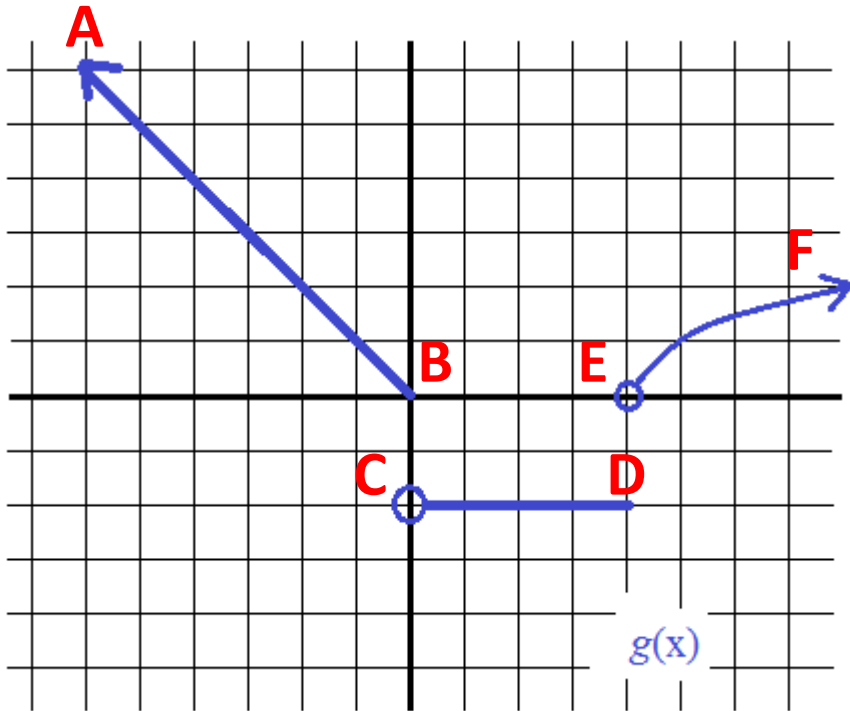
$$\text{Answer: } x = \frac{-1}{11}$$

$$13. \text{ LCD: } 3(w + 4)$$

$$\text{Answer: } w = -10$$

# HW Piecewise Review Answers

14. For the following function  $g$ , decide if each of the statements is true or false. If it is false, fix the equation or restriction.



1. The range of this function is  $[-2, \infty)$  *F*,  $\{-2\} \cup [0, \infty)$

2. The equation for the line from point A to B is  $g(x) = -2x$   
*F*,  $g(x) = -x$

3. From C to D the equation is  $g(x) = -2$  *True*

4. The restriction from C to D is  $0 \leq x < 5$  *F*,  $0 < x \leq 4$

5. The equation for E to F is  $g(x) = \sqrt{x} + 4$  *F*,  $g(x) = \sqrt{x - 4}$

# HW Answers Work

$$11) 1 = \frac{v+2}{v-4} + \frac{7v-42}{v-4} \quad \text{EV: } v=4 \quad \text{LCD: } v-4$$

$$v-4 = v+2 + 7v-42 \quad 1. v = \frac{36}{7} \quad 2. r = \frac{-5}{4}$$

$$v-4 = 8v-40 \quad 3. x=6, -3 \quad 4. x=-1$$

$$-v+40 = -v+40$$

$$\frac{36}{7} = \frac{7v}{7}$$

$$v = 36/7$$

$$13) 1 + \frac{x^2-5x-24}{3x} = \frac{x-6}{3x} \quad \text{EV: } x=0 \quad \text{LCD: } 3x$$

$$3x + x^2 - 5x - 24 = x - 6$$

$$x^2 - 2x - 24 = x - 6 \quad \leftarrow \text{quadratics so set } = 0 \text{ + solve}$$

$$-x + 6 \quad -x + 6$$

$$x^2 - 3x - 18 = 0$$

$$(x-6)(x+3) = 0$$

$$x = 6, -3$$

$$12) \frac{r-4}{5r} = \frac{1}{5r} + 1 \quad \text{EV: } r=0 \quad \text{LCD: } 5r$$

$$r-4 = 1 + 5r$$

$$-r \quad -1 \quad -1 \quad -r$$

$$\frac{-5}{4} = \frac{4r}{4}$$

$$\frac{-5}{4} = r$$

$$14) 1 = \frac{x(x+2)}{x^2+2x} + \frac{x-1}{x(x+2)} \quad \text{EV: } x=0, -2 \quad \text{LCD: } x(x+2)$$

$$x(x+2) = 1 + (x-1)(x+2)$$

$$x^2 + 2x = 1 + x^2 + 1x - 2 \quad \leftarrow \text{FOIL}$$

$$x^2 + 2x = x^2 + x - 1$$

$$-x^2 \quad -x \quad -x^2 \quad -1$$

$$x = -1$$

# HW Answers Work

$$15) \frac{n+5}{n+8} = 1 + \frac{6}{n+1} \quad \text{EV: } x_1 = -1, -8$$

$$\text{LCD: } (n+1)(n+8)$$

$$(n+5)(n+1) = (n+1)(n+8) + 6(n+8)$$

$$n^2 + 6n + 5 = n^2 + 9n + 8 + 6n + 48$$

$$n^2 + 6n + 5 = n^2 + 15n + 56$$

$$-n^2 - 6n - 56 - n^2 - 6n - 56$$

$$-51 = 9n$$

$$\boxed{n = \frac{-51}{9}} = -\frac{17}{3}$$

$$17) \frac{1}{x^2-5x} = \frac{x+7}{x(x-5)} - 1 \quad \text{EV: } x=0, 5$$

$$\text{LCD: } x(x-5)$$

$$1 = (x+7)(x-5) - 1x(x-5)$$

$$1 = x^2 + 2x - 35 - x^2 + 5x$$

$$1 = 7x - 35$$

$$+35 \quad +35$$

$$\frac{36}{7} = \frac{7x}{7}$$

$$\boxed{x = \frac{36}{7}}$$

$$16) \frac{r+5}{r^2-2r} - 1 = \frac{1}{r^2-2r}$$

$$\text{EV: } r=0, 2$$

$$\text{LCD: } r(r-2)$$

$$r+5 - 1r(r-2) = 1$$

$$r+5 - r^2 + 2r = 1$$

$$-r^2 + 3r + 5 = 1$$

$$-r^2 + 3r + 4 = 0$$

$$-1(r^2 - 3r - 4) = 0$$

$$-1(r-4)(r+1) = 0$$

$$\boxed{r=4, -1}$$

$$18) \frac{a-2}{a+3} - 1 = \frac{3}{(a+2)(a+5)} \quad \text{EV: } a=-2, 3$$

$$\text{LCD: } (a+2)(a+3)$$

$$(a-2)(a+2) - 1(a+2)(a+3) = 3(a+3)$$

$$a^2 - 4 - 1(a^2 + 5a + 6) = 3a + 9$$

$$a^2 - 4 - a^2 - 5a - 6 = 3a + 9$$

$$-5a - 10 = 3a + 9$$

$$-3a + 19 = 3a + 10$$

$$-8a = -9$$

$$\boxed{a = \frac{-19}{8}}$$

# HW Answers **Work**

Unit 4 Packet

Honors Common Core Math 2

$$18. \frac{\cancel{m}^{\cancel{(m+9)}}}{\cancel{m+9}} = \frac{\cancel{9}^{\cancel{(m+9)}}}{\cancel{m+9}} + 2(m+9)$$

$$m = 9 + 2(m+9)$$

$$m = 9 + 2m + 18$$

$$-2m \quad -2m$$

$$-m = 27$$

$$\boxed{m = -27}$$

19.

$$\frac{1}{\cancel{x-4}} + \frac{1}{\cancel{x-4}} = \frac{22}{\cancel{(x+4)}\cancel{(x-4)}} \cdot \frac{1}{\cancel{(x+4)}\cancel{(x-4)}}$$

$$1(x+4) + 1(x-4) = 22$$

$$x+4 + x-4 = 22$$

$$2x = 22$$

$$\boxed{x = 11}$$

$$EV: m = -9$$

$$18 \text{ LCD } \underline{m+9}$$

$$\text{Answer } \underline{m = -27}$$

$$EV: x = -4, 4$$

$$19 \text{ LCD } \underline{(x+4)(x-4)}$$

$$\text{Answer } \underline{x = 11}$$

# HW Answers Work

$$20. \frac{x \cancel{(x+6)} \cdot 1}{x-11} = \frac{22 \cancel{(x-11)} \cdot \cancel{(x+6)}}{x^2 - 5x - 66}$$

$$\frac{x}{x-11} = \frac{22}{(x-11)(x+6)}$$

$$x(x+6) = 1(x+6)(x-11) = 22$$

$$x^2 + 6x - 1(x^2 - 5x - 66) = 22$$

$$x^2 + 6x - x^2 + 5x + 66 = 22$$

$$11x + 66 = 22$$

$$66 - 66$$

$$11x = -44$$

$$\frac{11}{11} x = \frac{-44}{11}$$

$$x = -4$$

$$21. \frac{2x \cancel{(x+7)} \cdot x}{x+3} = \frac{x^2 - 1 \cdot \cancel{(x+7)} \cdot \cancel{(x+3)}}{x^2 + 10x + 21}$$

$$\frac{2x}{x+3} = \frac{x^2 - 1}{(x+7)(x+3)}$$

$$2x(x+7) - x(x+3) = x^2 - 1$$

$$2x^2 + 14x - x^2 - 3x = x^2 - 1$$

$$\cancel{x^2} + 11x = \cancel{x^2} - 1$$

$$\frac{11x}{11} = \frac{-1}{11}$$

$$x = \frac{-1}{11}$$

EV:  $x = 11, -6$

20 LCD  $(x-11)(x+6)$

Answer  $x = -4$

EV:  $x = -7, -3$

21 LCD  $(x+7)(x+3)$

Answer  $x = -\frac{1}{11}$

# HW Answers **Work**

$$22. \frac{\cancel{w} \cdot 3(\cancel{w+4})}{\cancel{w+4} \cdot 3} + \frac{1 \cdot (w+4)}{\cancel{3} \cdot \cancel{w+4}} = \frac{-12 \cdot 3(\cancel{w+4})}{\cancel{w+4}}$$

$$3w + 1(w+4) = -36$$

$$3w + w + 4 = -36$$

$$4w + 4 = -36$$

$$\begin{array}{r} -4 \quad -4 \\ 4w = -40 \\ \hline 4 \quad 4 \end{array}$$

$$\boxed{w = -10}$$

$$EV: w = -4$$

$$22 \text{ LCD } \underline{3(w+4)}$$

$$\text{Answer } \underline{w = -10}$$



# Tonight's Homework

Packet page 19-21 (updates on next slide)

Remember To Study For Your Test  
Tomorrow!!

Suggestion Of The Day: Use website, notes,  
Unit 4 Quiz 1 & 2, mini quizzes, and  
homework packet to help you study!!

## Tomorrow Night's Post-Test Homework

Packet p. 22-23 AND  
Print next packet

# Packet update...

For tomorrow Night's Test Review Homework  
Packet p. 19-21...

There are some **updates** to Packet p. 19

2.  ~~$y = 2[x - 1]$~~       $y = -2 |x - 1|$

**AND Omit #5, 9, 13**

Evaluate each expression

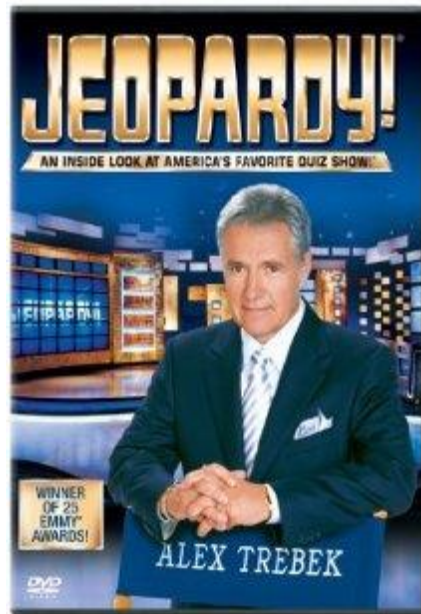
5. <del><math> 4.7  =</math></del>	6. $ 4.7  =$
9. <del><math> -4.7  =</math></del>	10. $ -4.7  =$

13. Solve the following equation for  $x$  and write in

set notation:  ~~$\left[ \frac{3}{2}x - 1 \right] = 8$~~

# Jeopardy Review!

## Advanced Functions Practice



Grab a whiteboard, marker, and eraser!