

# ICM ~ Unit 4 ~ Day 4

Range & Practice

# Warm Up ~ Day 4

1. Find the domain, range, x-intercepts, and y-intercepts, and end behavior using limit notation.

$$f(x) = \sqrt{4x^2 - 4x - 15}$$

The screenshot shows a Google Slides presentation titled "Warm Up ~ Day 4". The slide contains the following content:

- Equation:  $4x^2 - 4x - 15 = 0$
- Factored form:  $(2x+3)(2x-5) = 0$
- Solutions:  $x = -\frac{3}{2}, x = \frac{5}{2}$
- Domain:  $(-\infty, -\frac{3}{2}] \cup [\frac{5}{2}, \infty)$
- Range:  $y \geq 0$  and  $[0, \infty)$
- x-intercepts:  $(-\frac{3}{2}, 0), (\frac{5}{2}, 0)$
- Function:  $f(x) = \sqrt{4x^2 - 4x - 15}$
- Task 1: Find the domain, range, x-intercepts, and end behavior using limit notation.
- Task 2: Find the domain, x & y intercepts, and label any discontinuities.
- Function  $h(x) = \frac{\sqrt{x+15}}{x-3}$
- Handwritten note: "Pick up Quiz Review from crate by window if you missed it yesterday!"

2. Find the domain, x & y intercepts, and label any discontinuities:

$$h(x) = \frac{\sqrt{x+15}}{x-3}$$

The screenshot shows a Google Slides presentation titled "Warm Up ~ Day 4". The slide contains the following content:

- Equation:  $x+15 \geq 0$
- Equation:  $x \geq -15$
- Equation:  $x-3 \neq 0$
- Function:  $h(x) = \frac{\sqrt{x+15}}{x-3}$
- Task 1: Find the domain, range, x-intercepts, and end behavior using limit notation.
- Task 2: Find the domain, x & y intercepts, and label any discontinuities.
- Handwritten note: "Pick up Quiz Review from crate by window if you missed it yesterday!"

# Warm Up ~ Day 4 **ANSWERS**

1. Find the domain, range, x-intercepts, and y-intercepts and end behavior using limit notation.

$$f(x) = \sqrt{4x^2 - 4x - 15} = \sqrt{(2x + 3)(2x - 5)}$$

*x-int*:  $(-3/2, 0) \& (5/2, 0)$       *y-int*: *none*

*Domain*:  $(-\infty, -3/2] \cup [5/2, \infty)$       *Range*:  $[0, \infty)$

$$\lim_{x \rightarrow \infty} f(x) = \infty$$

$$\lim_{x \rightarrow -\infty} f(x) = \infty$$

2. Find the domain, x & y intercepts, and label any discontinuities:

$$h(x) = \frac{\sqrt{x + 15}}{x - 3}$$

*Domain*:  $[-15, 3) \cup (3, \infty)$

*x-int*:  $(-15, 0)$

*y-int*:  $(0, -\frac{\sqrt{15}}{3})$

Nonremovable  
Discontinuity  
(Vertical  
Asymptote  
at  $x = 3$ )

# **Day 4 Homework Assignment:**

**Quiz 1 Review and Handout Extra Practice  
Unit 3 ICM - both are on the website**

# Announcements

**⋮**  
**Unit 3 Quiz on next class meeting day!**

# Notes Day 4: Range and Practice

A Graphical Approach

# Notes: Finding the Range of a Function

- Use numeric, algebraic and graphical approaches simultaneously.
- Keep in mind we are finding ALL y-coordinates of points on the graph.
- Write the range of the following functions in interval notation.

$$f(x) = \sqrt{3x - 12}$$

$$g(x) = \frac{x^2 - 9}{x^2 - x - 12}$$

$$h(x) = \frac{\sqrt{x + 1}}{x - 4}$$

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$(x+3)(x-3)$   
 $(x-4)(x+3)$   
 hole  $x = -3$   
 $y = \frac{-3 \cdot 3}{-3 - 4} = \frac{-9}{-7} = \frac{9}{7}$   
 hole  $(-3, \frac{9}{7})$

Notes: Finding the Range of a Function

- Use numeric, algebraic and graphical approaches simultaneously.
- Keep in mind we are finding ALL y-coordinates of points on the graph.
- Write the range of the following functions in interval notation.

$f(x) = \sqrt{3x - 12}$        $g(x) = \frac{x^2 - 9}{x^2 - x - 12}$

Horizontal Asymptotes? ???  $h(x) = \frac{\sqrt{x + 1}}{x - 4}$

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$\frac{\sqrt{x+1}}{x-4} \geq 0$   
 pos./neg.

Notes: Finding the Range of a Function

- Use numeric, algebraic and graphical approaches simultaneously.
- Keep in mind we are finding ALL y-coordinates of points on the graph.
- Write the range of the following functions in interval notation.

$f(x) = \sqrt{3x - 12}$        $g(x) = \frac{x^2 - 9}{x^2 - x - 12}$   
 Range:  $[0, \infty)$       Range:  $(-\infty, 6/7) \cup (6/7, 1) \cup (1, \infty)$

Horizontal Asymptotes? ???  $h(x) = \frac{\sqrt{x + 1}}{x - 4}$   
 Range:  $(-\infty, \infty)$

# Notes: Finding the Range of a Function

- Use numeric, algebraic and graphical approaches simultaneously.
- Keep in mind we are finding ALL y-coordinates of points on the graph.
- Write the range of the following functions in interval notation.

$$f(x) = \sqrt{3x - 12}$$

*Range:  $[0, \infty)$*

$$g(x) = \frac{x^2 - 9}{x^2 - x - 12}$$

*Range:  $(-\infty, 6/7) \cup (6/7, 1) \cup (1, \infty)$*

$$h(x) = \frac{\sqrt{x + 1}}{x - 4}$$

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

Horizontal  
Asymptotes?  
???



# Summary

## Domain:

Consider the **vertical asymptotes** and the x-value of the **hole**

Make sure values under the radical are positive

## Range:

Consider the **horizontal asymptotes** and the y-value of the **hole** **AND intercepts, if they exist**

## x-intercept:

Set  **$y = 0$**  and solve for  **$x$** .

## y-intercept:

Set  **$x = 0$**  and solve for  **$y$** .

# Finding the Range of a Function

- Use numeric, algebraic and graphical approaches simultaneously.
- Keep in mind we are finding ALL y-coordinates of points on the graph.
- Write the range of the following functions in interval notation.

**You  
Try!**

$$f(x) = \sqrt{2x + 7}$$

$$g(x) = \frac{8}{2x + 12}$$

$$m(x) = \frac{\sqrt{x}}{x - 9}$$

Horizontal  
Asymptotes?  
???

The screenshot shows a presentation slide with the following content:

- Handwritten notes:**
  - $\sqrt{\quad} \geq 0$
  - $[0, \infty)$
  - $\frac{8}{2(x+6)} = \frac{4}{x+6}$
  - HA.  $y=0$
  - $(-\infty, 0) \cup (0, \infty)$
- Printed text:**
  - Finding the Range of a Function**
  - Use numeric, algebraic and graphical approaches simultaneously.
  - Keep in mind we are finding ALL y-coordinates of points on the graph.
  - Write the range of the following functions in interval notation.
- Mathematical examples:**
  - $f(x) = \sqrt{2x + 7}$
  - $g(x) = \frac{8}{2x + 12}$
  - $m(x) = \frac{\sqrt{x}}{x - 9}$
- Other notes:**
  - HA  $y=0$
  - $(0, 0)$
  - $(-\infty, \infty)$
  - Horizontal Asymptotes? ???

# Finding the Range of a Function

- Use numeric, algebraic and graphical approaches simultaneously.
- Keep in mind we are finding ALL y-coordinates of points on the graph.
- Write the range of the following functions in interval notation.

$$f(x) = \sqrt{2x + 7}$$

*Range:  $[0, \infty)$*

$$g(x) = \frac{8}{2x + 12}$$

*Range:  $(-\infty, 0) \cup (0, \infty)$*

**You  
Try!**

$$m(x) = \frac{\sqrt{x}}{x - 9}$$

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

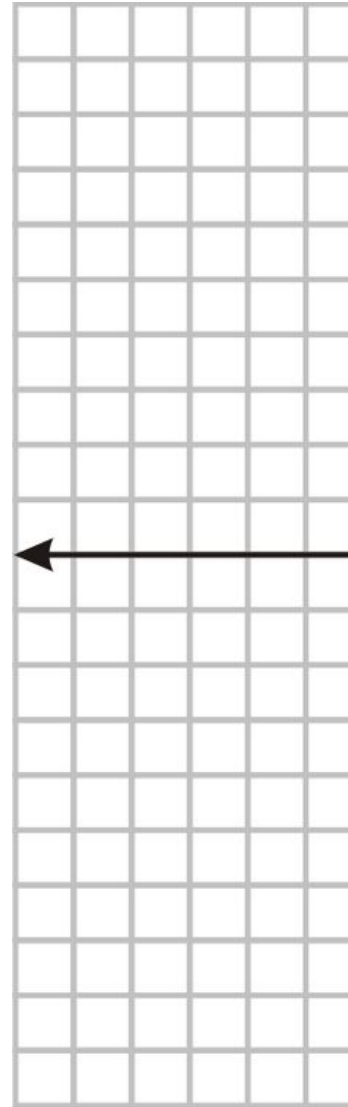
Horizontal  
Asymptotes?  
???

# Practice

Find

- Domain
- Hole(s) and Asymptote(s)
- x & y intercepts
- End Behavior using limits
- Range
- Graph all key features, plotting at least 3 exact points per section of the curve.

$$g(x) = \frac{-8x - 48}{2x^2 + 5x - 42}$$



Day 4 - Range & Practice 5/19

Practice

Find

- Domain
- Hole(s) and Asymptote(s)
- x & y intercepts
- End Behavior using limits
- Range
- Graph all key features, plotting at least 3 exact points per section of the curve.

$$g(x) = \frac{-8(x+6)}{2(x-7)(x+6)}$$

$x \neq \frac{7}{2}, x \neq -6$

$(-\infty,$

Day 4 - Range & Practice 5/19

Practice

Find

- Domain
- Hole(s) and Asymptote(s)
- x & y intercepts
- End Behavior using limits
- Range
- Graph all key features, plotting at least 3 exact points per section of the curve.

$$g(x) = \frac{-8x - 48}{2x^2 + 5x - 42}$$

hole  $(-6, \frac{8}{19})$

HA  $x = \frac{7}{2}$

VA  $x = \frac{7}{2}$

# Practice!

$$24.) g(x) = \frac{x}{x-2}$$

$$11.) f(x) = \frac{x-1}{(x+3)(x-1)}$$

$$21.) g(x) = \frac{3}{x} + 1$$

$$23.) f(x) = \frac{|x-1|}{x}$$

Find the...

-Domain

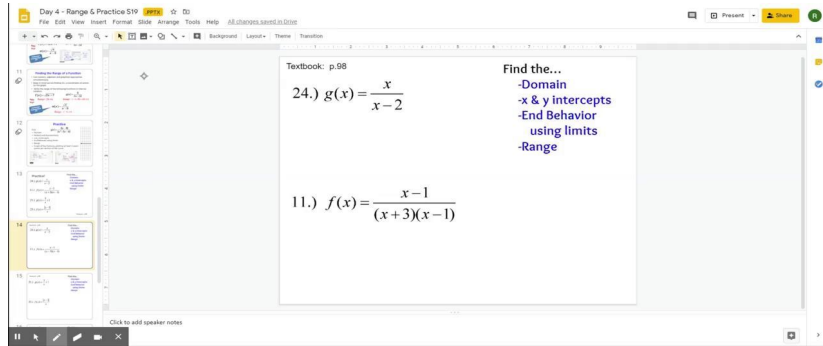
-x & y intercepts

-End Behavior  
using limits

-Range

Textbook: p.98

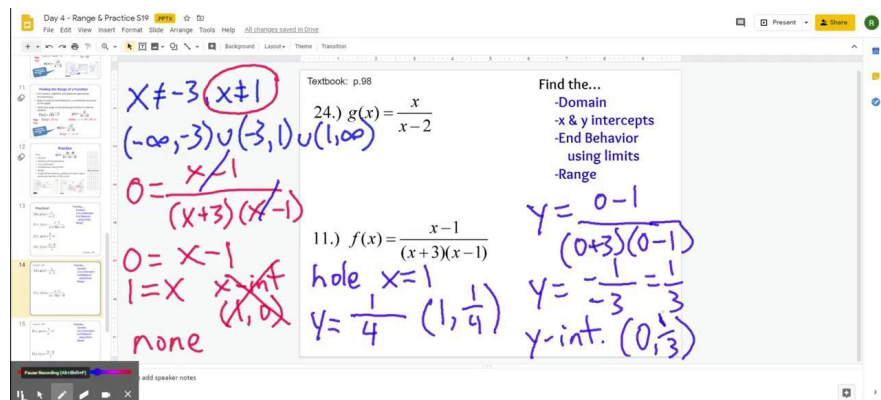
$$24.) g(x) = \frac{x}{x-2}$$



$$11.) f(x) = \frac{x-1}{(x+3)(x-1)}$$

Find the...

- Domain
- x & y intercepts
- End Behavior using limits
- Range



Textbook: p.98

$$21.) \quad g(x) = \frac{3}{x} + 1$$

$$23.) \quad f(x) = \frac{|x-1|}{x}$$

Find the...

- Domain
- x & y intercepts
- End Behavior using limits
- Range

Day 4 - Range & Practice 519

Textbook: p.98

Find the...

- Domain
- x & y intercepts
- End Behavior using limits
- Range

21.)  $g(x) = \frac{3}{x} + 1$

$g(x) = \frac{3+x}{x}$

23.)  $f(x) = \frac{|x-1|}{x}$

$x \neq 0$

$(-\infty, 0) \cup (0, \infty)$

Day 4 - Range & Practice 519

Textbook: p.98

Find the...

- Domain
- x & y intercepts
- End Behavior using limits
- Range

21.)  $g(x) = \frac{3}{x} + 1$

23.)  $f(x) = \frac{|x-1|}{x}$

$x \neq 0$

$(-\infty, 0) \cup (0, \infty)$

$0 = \frac{|x-1|}{x}$

$0 = |x-1|$

$x = 1$

$x\text{-int. } (1, 0)$

Find the...

$$24.) g(x) = \frac{x}{x-2}$$

$$\lim_{x \rightarrow \infty} g(x) = 1$$

$$\lim_{x \rightarrow -\infty} g(x) = 1$$

*Domain*:  $(-\infty, 2) \cup (2, \infty)$

*Range*:  $(-\infty, 1) \cup (1, \infty)$

*x-int*:  $(0, 0)$

*y-int*:  $(0, 0)$

-Domain

-x &amp; y intercepts

-End Behavior

using limits

-Range

$$11.) f(x) = \frac{x-1}{(x+3)(x-1)}$$

$$\lim_{x \rightarrow \infty} f(x) = 0$$

$$\lim_{x \rightarrow -\infty} f(x) = 0$$

*Domain*:  $(-\infty, -3) \cup (-3, 1) \cup (1, \infty)$

*Range*:  $(-\infty, 0) \cup (0, \frac{1}{4}) \cup (\frac{1}{4}, \infty)$

*x-int*: none

*y-int*:  $(0, \frac{1}{3})$

*Hole*:  $(1, \frac{1}{4})$



Find the...

$$21.) \quad g(x) = \frac{3}{x} + 1$$

$$\lim_{x \rightarrow \infty} g(x) = 1$$

$$\lim_{x \rightarrow -\infty} g(x) = 1$$

*Domain:*  $(-\infty, 0) \cup (0, \infty)$

*Range:*  $(-\infty, 1) \cup (1, \infty)$

*x-int:*  $(-3, 0)$

*y-int:* *none*

-Domain

-x &amp; y intercepts

-End Behavior

using limits

-Range

$$23.) \quad f(x) = \frac{|x-1|}{x}$$

$$\lim_{x \rightarrow \infty} f(x) = 1$$

$$\lim_{x \rightarrow -\infty} f(x) = -1$$

*Domain:*  $(-\infty, 0) \cup (0, \infty)$

*Range:*  $(-\infty, -1) \cup [0, \infty)$

*x-int:*  $(1, 0)$

*y-int:* *none*

HW:

Quiz #1 Review and Handout Extra  
Practice Unit 3 ICM - on website

Quiz on next class meeting day!