

ICM ~Unit 4 ~ Day 2

(Extra Day for PSAT/Practice)

Section 1.2— Horizontal Asymptotes, &
Domain and Discontinuities Practice

Warm Up

Find the domain, x & y intercepts, and label any discontinuities (including if they are removable or non-removable).

$$1. h(x) = \frac{\sqrt{25 - x^2}}{x - 4}$$

$$2) f(x) = \frac{x^2 - 4x}{x^3 + 4x^2 - 32x}$$

Warm Up ANSWERS

Find the domain, x & y intercepts, and label any discontinuities (including if they are removable or non-removable).

1. $h(x) = \frac{\sqrt{25 - x^2}}{x - 4}$

Domain: $[-5, 4) \cup (4, 5]$

x-int: $(-5, 0)$ & $(5, 0)$

y-int: $(0, -\frac{5}{4})$

Nonremovable Discontinuity (Vertical Asymptote at $x = 4$)

2) $f(x) = \frac{x^2 - 4x}{x^3 + 4x^2 - 32x}$

x-int: none

y-int: none (hole there)

Hole (removable disc.): $(0, \frac{1}{8})$ and $(4, \frac{1}{12})$

V.A. (non-removable disc.) $x = -8$

Homework Questions?

Tonight's Homework

Finish Rational Summary

& 5 Factoring Problems from the
Puzzle

More Rational Fncns Handout

Evans

Homework

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Notes Day 2 (Extra Day)

Section 1.2—Horizontal Asymptote and
Domain and Discontinuities Practice

Definition of Degree

- **Degree of a polynomial in one variable:**
the value of the greatest exponent

Ex: $f(x) = 4x^2 + 9x + 8$ **Degree: 2**

Ex: $g(x) = -5x^3 + 6x^2 + 4x$ **Degree: 3**

Ex: $h(x) = 5x^2 + 3x^4 + 2x$ **Degree: 4**

Watch out...the polynomial may not be in order!!

- **Degree can help us with determining the horizontal asymptote of rational functions...**

Asymptote Lab

Packet p. 4-5

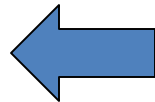
Let's do one or two together!

Examine the table of values below. All of the following statements are true EXCEPT

x	y_1	y_2
-2.03	-66.67	-4.03
-2.02	-100	-4.02
-2.01	-200	-4.01
-2	ERROR	ERROR
-1.99	200	-3.99
-1.98	100	-3.98
-1.97	66.667	-3.97

$x = -2$

You'll do an Asymptote Lab to learn more about this.

- A. $x = -2$ is a vertical asymptote in y_1
- B. $x = -2$ is an infinite discontinuity in y_1
- C. $x = -2$ is a removable discontinuity in y_2
- D. $x = -2$ is a vertical asymptote in y_2 

Looking at y_2 , the y 's are in order, but $y = -4$ was skipped, so there is a Removable Discontinuity (Hole) at $(-2, -4)$

Horizontal Asymptotes

For horizontal asymptotes, think BOSTON for *polynomials*! Looking at the degree of top & bottom...

Bottom > Top

$$f(x) = \frac{2x}{x^2 + 3x}$$

H.A. : $y = 0$

y=0

Same = ratio

$$g(x) = \frac{2x^3}{5x^3 + 4x^2}$$

H.A. : $y = \frac{2}{5}$

Top > Bottom

↑ **O** No HA.
N

$$h(x) = \frac{5x^2}{7x + 3}$$

No H.A.

You Try! What is the EQUATION of the horizontal asymptote for the following functions?

$$f(x) = \frac{3x^2 + 9}{7x + 4x^2 + 11}$$

Bottom > Top

y=0

Same = ratio

Top > Bottom

↑ 0 No HA.
N

$$g(x) = \frac{4x^3}{5x^2 + 9}$$

$$h(x) = \frac{7x + 15}{2x^2}$$

You Try! What is the EQUATION of the horizontal asymptote for the following functions?

$$f(x) = \frac{3x^2 + 9}{7x + 4x^2 + 11}$$

$$H.A. : y = \frac{3}{4}$$

Bottom > Top
y=0
Same = ratio
Top > Bottom
↑ 0 No HA.
N

$$g(x) = \frac{4x^3}{5x^2 + 9}$$

H.A. : none

$$h(x) = \frac{7x + 15}{2x^2}$$

H.A. : y = 0

Rational Summary

Let's Summarize some rules
and steps for discontinuities
of Rational Functions

Practice – Finish for part of Homework

- Rational Summary &
- More Rational Fncns Handout

Domain Practice

Around the Room Activity
(if time allows)

You Try: True or False

- 1) The graph of function f is defined as the set of all points $(x, f(x))$ where x is in the domain of f . Justify your answer.
- 2) If a function is not continuous, then the domain cannot be all real numbers.

True or False ANSWERS

- 1) The graph of function f is defined as the set of all points $(x, f(x))$ where x is in the domain of f . Justify your answer.

True! This is the definition of a function.

- 2) If a function is not continuous, then the domain cannot be all real numbers.

False! It could be a piecewise function.

Is this continuous?

State whether the scenario is continuous or discontinuous.

- A) Outdoor temperature as a function of time.

Continuous

- B) Number of soft drinks sold at a ballpark as a function of outdoor temp. **Discontinuous**

- C) Your hair length as a function of days in a year

Continuous

Homework

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Puzzle
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Evans