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).

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

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

Warm Up ANSWERS

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

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

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

$$x-\text{int}: (-5,\ 0)\ \&\ (5,0)$$

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

Nonremovable Discontinuity (Vertical Asymptote at x = 4)

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

$$x-\text{int}: none$$

$$y-\text{int}: none\ (hole\ there)$$

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

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

Homework Questions?

Tonight's Homework

Finish Rational Summary

& 5 Factoring Problems from the Puzzle

More Rational Fncns Handout

Evens

Homework

- Finish Rational Summary

& 5 Factoring Problems from the Puzzle

- More Rational Fncns Handout Evens

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

y=**O**

Same = ratio

Top > Bottom

O No HA.

N

$$f(x)=\frac{2x}{x^2+3x} \qquad H.A.: y=0$$

$$g(x)=\frac{2x^3}{5x^3+4x^2} \qquad H.A.: \ y=\frac{2}{5}$$

$$h(x)=\frac{5x^2}{7x+3} \qquad No\ H.A.$$

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

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

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

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

Bottom > Top

y=**O**

Same = ratio

Top > Bottom

$\uparrow$ **O** No HA.

N

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

Bottom > Top

y=**O**

Same = ratio

Top > Bottom

O No HA.

N

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

$H.A.: y = 3/4$

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

$H.A.: none$

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

$H.A.: y = 0$

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

- Finish Rational Summary

& 5 Factoring Problems from the Puzzle

- More Rational Fncns Handout Evens