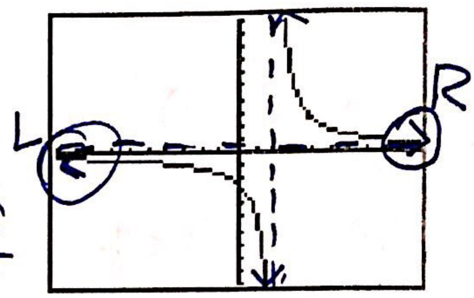
Algebra II WS Day 1 Name ______________ Period ________



Part I: Let's consider the curve $f(x) = \dfrac{5}{x-2}$ and learn about some of the characteristics of the function.

1. Use interval notation to describe the domain of $f(x)$. x-values (Look left to right)

$(-\infty, 2) \cup (2, \infty)$ OR

All ℝ's except $x \neq 2$

2. Use interval notation to describe the range of $f(x)$. $(-\infty, 0) \cup (0, \infty)$

y-values (Look Bottom to Top) OR All ℝ's except $y \neq 0$

3. What are the roots or zeros of $f(x)$. NONE

(x-intercepts)

4. Describe the end behavior of $f(x)$. $x \to -\infty, f(x) \to$ 0 (L) $x \to \infty, f(x) \to$ 0 (R)

5. When will $f(x)$ intersect the y-axis? $(0, -2.5)$

(plug zero in for x)

$\frac{5}{0-2} = -\frac{5}{2} = -2.5$

Part 2: Find the roots and y-intercept of the functions.

1. $f(x) = \dfrac{-2x+5}{x+1}$

Top Roots $\frac{5}{2}$ OR 2.5

Plug in 0 y-intercept $(0, 5)$

$-2x+5=0$

$-2x=-5$

$x=\frac{5}{2}$

$\frac{5}{1}$

5

2. $f(x) = \dfrac{3x-2}{x}$

Roots $2/3$

y-intercept NONE

$3x-2=0$

$3x=2$

$x=\frac{2}{3}$

$\frac{-2}{0} =$ undef.

3. $f(x) = \dfrac{x^2-6x+8}{x^2-16}$ $\dfrac{\cancel{(x-4)}(x-2)}{(x+4)\cancel{(x-4)}} = \dfrac{x-2}{x+4}$

Roots 2

y-intercept $(0, -\frac{1}{2})$

$\frac{8}{-16} = -\frac{1}{2}$

$\frac{-2}{4}$

$-\frac{1}{2}$

4. $f(x) = \dfrac{2x^2-6x-8}{x^2-4}$

Roots 4, −1

y-intercept $(0, 2)$

$\dfrac{2(x^2-3x-4)}{(x+2)(x-2)} = \dfrac{2(x-4)(x+1)}{(x+2)(x-2)}$

5. $f(x) = \dfrac{x^2-6x+8}{x^2-9}$

Roots ______

y-intercept ______

6. $f(x) = \dfrac{(x^3-3x^2)-(x+3)}{x^2-16}$

Roots 3, 1, −1

y-intercept $(0, -3/16)$

$x^2(x-3)-1(x-3)$

$(x-3)(x^2-1)$

$\dfrac{(x-3)(x+1)(x-1)}{(x+4)(x-4)}$

Rational Functions

Asymptotes	
Vertical (VA)	Horizontal (HA)
* occurs when the function is undefined. * Find VA by setting the denominator equal to zero & solving for x.	* The graph will have one OR NO HA, by comparing the highest degree of the numerator & denominator. ① Bigger Degree on Top: NO HA ② Bigger Degree on Bottom: $y=0$ ③ Degrees are same: $y = \frac{\text{lead coefficient on top}}{\text{lead coefficient on bottom}}$

Ex: Identify the zeros, the vertical and horizontal asymptotes.

1. $f(x) = \frac{2x^1 - 4}{x^1 - 1}$

$f(x) = \frac{2(x-2)}{x-1}$

Top Zeros: 2

y-intercept: $\frac{-4}{-1} = 4$ $(0, 4)$

Bottom VA: $x = 1$

Deg. HA: $y = \frac{2}{1} = 2$

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

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

T Zeros: 0 & 2

y-intercept: $\frac{0}{-3} = 0$ $(0,0)$

B VA: $x = 3$ & $x = -1$

D HA: $y = 1$

3. $f(x) = \frac{x+4}{2x^2 - 18}$

$f(x) = \frac{x+4}{2(x^2-9)}$

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

T Zeros: -4

y-intercept: $-\frac{4}{18} = \frac{-2}{9}$ $(0, -\frac{2}{9})$

B VA: $x = 3$ & $x = 3$

D HA: $y = 0$

4. $f(x) = \frac{x^3 - x^2 - 6x}{-4x^2 + 4x + 8}$

$f(x) = \frac{x(x^2 - x - 6)}{-4(x^2 - x - 2)}$

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

Zeros: 0, 3, -2

y-intercept: $(0,0)$

VA: $x = 2$ & $x = -1$

HA: NONE