Bellwork Alg 2A Monday, May 22, 2017

For each rational function find the points of discontinuity, if any, and classify each as either a Hole or a Vertical Asymptote.

1. $\frac{2x^2 - 7x - 4}{2x^4 - 8x^3 - 18x^2 + 72x}$

2. $\frac{x^2 - 2x - 24}{3x^2 + 12}$

3. $\frac{4x^2 - 12x}{2x^3 - 12x^2 + 18x}$

Pts of Discontinuity

Holes:

VA:

Pts of discontinuity

Holes:

VA:

Pts of discontinuity

Holes:

VA:

Horizontal Asymptotes depend on the relationship between the degrees of the numerator and the denominator.

Case 1: If the degree of the numerator is greater than the degree of the denominator: There is NO HA

Case 2: If the degrees of the numerator and denominator or equal: HA: $y =$ ratio of the leading coefficients

Case 3: If the degree of the denominator is greater than the degree of the numerator: HA: $y = 0$

Write the equations of the Horizontal Asymptotes, if any, for each Rationa Function.

4. $y = \frac{2x^2 - 5x + 3}{x^2 - 6x - 10}$

EQ of HA:

5. $y = \frac{x^3 + 7x^2 + 11x}{x^2 + 4x - 3}$

EQ of HA:

6 $y = \frac{8x^2 - 7x}{x^3 + 4x^2 + 9x - 1}$

EQ of HA:

7 $y = \frac{8x^4 + 3x^2 + 11x - 9}{4x^3 - 7x^2 - x^4 - 3}$

EQ of HA:

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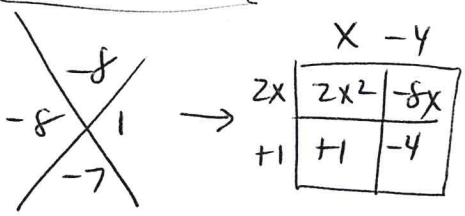
Answers

(1) $2x^2-7x-4 = (2x+1)(x-4)$



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

$2x^4-8x^3-18x^2+72x = 2x(x-4)(x+3)(x-3)$

$2x(x^3-4x^2-9x+36)$

	x	-4
x2	x^3	$-4x^2$
-9	$-9x$	$+36$

points of Discontinuity are: $x = 0, 4, \pm 3$

Holes: $x = 4$

VA: $x = 0, \pm 3$

(2) $\frac{x^2-2x-24}{3x^2+12}$ → denominator has no real zeros → No points of Discontinuity

(3) $\frac{4x^2-12x}{2x^3-12x^2+18x}$

$4x^2-12x = 4x(x-3)$

$2x^3-12x^2+18x = 2x(x-3)^2$

$= 2x(x^2-6x+9)$

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

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

even though you can cancel an x-3 from numerator & denominator there is still x-3 in the denom.

points of Discontinuity are: $x = 0, 3$

Holes: $x = 0$

VA: $x = 3$

(4) $y = \frac{2x^2 - 5x + 3}{x^2 - 6x - 10}$

degree of num. = 2
degree of denom. = 2
> same degrees

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

(5) $y = \frac{x^3 + 7x^2 + 11x}{x^2 + 4x - 3}$

degree of num. = 3
degree of denom = 2
> degree of num. is greater

NO HA

(6) $y = \frac{8x^2 - 7x}{x^3 + 4x^2 + 9x - 1}$

degree of num. = 2
degree of denom. = 3
> degree of denom is greater

HA: $y = 0$

(7) $y = \frac{8x^4 + 3x^2 + 11x - 9}{4x^3 - 7x^2 - x^4 - 3}$

degree of num = 4
degree of denom = 4
> same degrees

HA: $y = \frac{8}{-1} = -8$