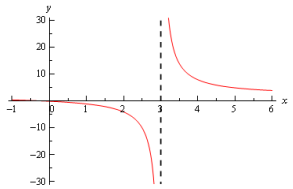
Graphing Rational Functions



Oct 23-8:36 PM

Pp. 301-303

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

$6) P(x) = x^3 + 5x^2 - 3x - 15$

$8) P(x) = x^3 + 2x^2 - 12x - 16$

$14) P(x) = x^4 - 3x^3 - 7x^2 + 15x + 18$

18) 4th root is $\sqrt{2}$

20) 3rd root is $-i$, 4th root is $-3-\sqrt{3}$

26) 4th root is $\sqrt{3}$, 5th root is $-2i$

$34) P(x) = x^3 - 3x^2 + x + 5$

$37) P(x) = x^3 - 5x^2 + 16x - 80$

Oct 3-10:21 AM

⑥ $-5, \sqrt{3}, -\sqrt{3}$ $P(x) = (x+5)(x^2-3)$

$(x+5)$ $a = 1$

$b = -(\sqrt{3} + -\sqrt{3})$

$= 0$

$c = (\sqrt{3})(-\sqrt{3}) = -3$

Oct 26-10:02 AM

$2-i, -1$

$2+i$ $P(x) = (x^2-4x+5)(x+1)$

$a = 1$

$b = -4$

$c = 4 - i^2, 5$

Oct 26-10:04 AM

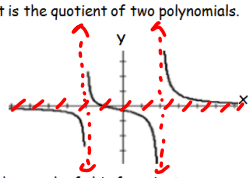
$P(x) = (x+2)^1(x-3)^2(x+1)^1$

$= (x+2)(x-3)(x-3)(x+1)$

Oct 26-10:05 AM

RATIONAL FUNCTIONS → Function that is the quotient of two polynomials.

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



What are some of the characteristics of the graph of this function?

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All rational functions can have vertical and horizontal asymptotes.

Vertical Asymptote:
- a. at any (all) roots of the denominator (set denominator = 0 and solve)
- b. Equation: x = constant
- c. On graph → dotted line, technically not part of the graph
- d. CANNOT cross a vertical asymptote

Horizontal Asymptote:
- a. Equation y = constant or y = 0
- b. Degree of numerator = n; Degree of denominator = d
  1. n < d → HA: y = 0 → $f(x) = \frac{x}{x^2}$
  2. n = d → HA: $y = \frac{\text{leading coefficient}}{\text{leading coefficient}}$ → $f(x) = \frac{x^2}{2x^2}$ $y = \frac{1}{2}$
  3. n > d → no HA
- c. Graph CAN cross a horizontal asymptote
  Simplified Equation = HA → Solve

$y = \frac{x^2}{x}$

x-intercept: Where graph crosses x-axis, y = 0
Set numerator = 0
Express as point(s) (x,0)

y-intercept: Where graph crosses y-axis, x = 0
Express as point plug into the equation (0,y)

Oct 4-9:03 AM

Find x and y-intercepts, v.a. and h.a., and determine if the graph crosses the HA for each:

1. $y = \frac{2x}{x+2}$

① VA $x+2 : 0$
den : 0 $x : -2$
② HA n = d
$y : 2$
③ x-int: $2x : 0$ (0,0)
num : 0 $x : 0$
④ y-int: $y : \frac{2(0)}{0+2} : 0$ (0,0)
Set x : 0
⑤ Cross?

$\frac{2x}{x+2} : \frac{2}{1}$

$2x : 2(x+2)$

$2x : 2x+4$

$-2x \quad -2x$

$0 : 4$ no cross

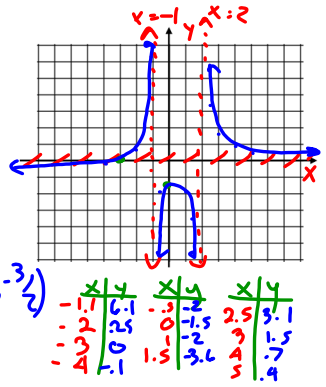
2. $y = \frac{x-4}{3x-5}$

Oct 22-3:14 PM

Analyze and graph the following:

3. $y = \frac{x+3}{x^2-x-2}$ $\frac{x+3}{(x-2)(x+1)}$

VA: $x-2 : 0$ $x+1 : 0$
$x : 2$ $x : -1$
HA: n < d
$y : 0$
x-int: $x+3 : 0$ (-3,0)
$x : -3$
y-int: $y : \frac{0+3}{0^2-0-2} : -\frac{3}{2}$ $(0, -\frac{3}{2})$
Cross? $\frac{x+3}{x^2-x-2} : \frac{0}{1}$
$x+3 : 0$ yes
$x : -3$



x	y
-1.1	6.1
-2	2.5
-3	0
-4	-1

x	y
-.3	-2
0	-1.5
1	-2
1.5	-3.6

x	y
2.5	3.1
3	1.5
4	.7
5	.4

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

VA:
HA:
x-int:
y-int:
Cross?

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Homework:

pg 302: 60

pg 318 - 319: 8, 12, 16, 20

Ditto 3.1: 1, 2

Graded HW Due Tomorrow!

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