

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

Pp. 301-303

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

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

20) $\deg = 4$

$$i, -3 + \sqrt{3}$$
$$-i, -3 - \sqrt{3}$$

37) $-4i, 5, 4i \quad (x-5)$

$$S: 0, b=0$$

$$f: -16i^2 = 16 = c$$

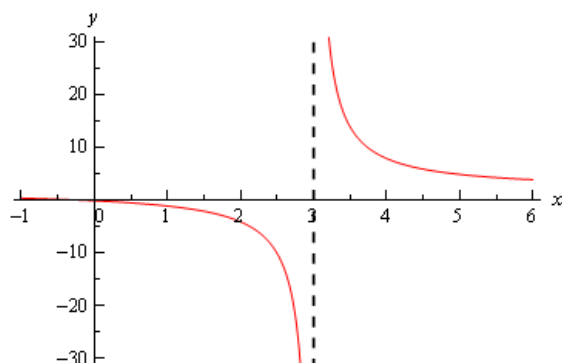
$$p(x) = (x-5)(x^2+16)$$

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

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

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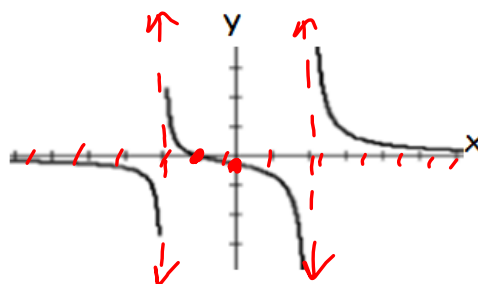
Graphing Rational Functions



Oct 23-8:36 PM

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?

Oct 23-8:49 PM

All rational functions can have vertical and horizontal asymptotes.

Vertical Asymptote: VA where $f(x)$ is undefined (can't $\div 0$)

- at any (all) roots of the denominator (set denominator = 0 and solve)
- Equation: $x = \text{constant}$
- On graph $\rightarrow$ dotted line, technically not part of the graph
- CANNOT cross a vertical asymptote

Horizontal Asymptote: HA $\frac{f}{g}$

- Equation $y = \text{constant}$ or $y = 0$
- Degree of numerator = n ; Degree of denominator = d

- $n < d \rightarrow \text{HA: } y = 0$
- $n = d \rightarrow \text{HA: } y = \frac{\text{leading coefficient}}{\text{leading coefficient}}$
- $n > d \rightarrow \text{no HA}$

- Graph CAN cross a horizontal asymptote
Simplified Equation = HA $\rightarrow$ Solve

x-intercept: Where graph crosses x-axis, $y = 0$

$\rightarrow$ Set numerator = 0

Express as point(s) $y = \frac{\text{num}}{\text{denom}} = \frac{0}{\text{denom}}$
 $\text{num} = 0$

y-intercept: Where graph crosses y-axis, $x = 0$
Express as point

divide the degree terms

$$\frac{x^2}{x^2} = 1$$

$$y = 1$$

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

$$\frac{x}{x^2} \rightarrow y = 0$$

$$\frac{x^2}{x} = x \quad \text{No HA}$$

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 $\text{denom} = 0$
 $x+2=0$
 $x = -2$

② HA: $\frac{2x}{x} = 2 \quad y = 2$

Cross? $2 = \frac{2x}{x+2}$

$$\begin{array}{r} 2x+4 = 2x \\ -2x \quad -2x \\ \hline 4 \neq 0 \end{array} \quad \text{No cross}$$

③ x-int Set $y = 0$

$$0 = \frac{2x}{x+2}$$

$$0 = 2x$$

$$x = 0 \quad (0,0)$$

y-int Set $x = 0$

$$y = \frac{2(0)}{0+2} = \frac{0}{2} = 0$$

$$(0,0)$$

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

Oct 22-3:14 PM

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

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

$$\textcircled{1} \text{ VA: den} = 0$$

$$x+2=0$$

$$x=-2$$

$$\textcircled{2} \text{ HA: Poly. Long D}$$

$$x+2 \overline{) 2x}$$

$$y=2$$

$$\textcircled{3} \text{ Cross HA?}$$

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

$$\frac{2x+4}{-2x} = \frac{2x}{-2x}$$

$$4 \neq 0$$

$$\textcircled{4} \text{ x-int: } y=0$$

$$\frac{0}{1} = \frac{2x}{x+2}$$

$$\frac{0}{2} = \frac{2x}{2}$$

$$x=0$$

$$(0,0)$$

$$\textcircled{5} \text{ y-int: } x=0$$

$$y = \frac{2(0)}{0+2}$$

$$y=0$$

$$(0,0)$$

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

$$\text{VA: den} = 0$$

$$3x-5=0$$

$$3x=5$$

$$x=\frac{5}{3} \quad x=-\frac{5}{3}$$

$$\text{HA: } x^2-9 \overline{) 0}$$

$$\frac{0}{x^2-9} = 0$$

$$\text{x-int: } 0 = \frac{x-4}{3x-5}$$

$$0 = x-4$$

$$x=4 \rightarrow (4,0)$$

$$\text{y-int: } y = \frac{0-4}{0-5} = \frac{4}{5}$$

$$(0, \frac{4}{5})$$

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Analyze and graph the following:

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

$$\text{VA: } x^2-x-2=0$$

$$(x-2)(x+1)=0$$

$$x=2 \quad x=-1$$

$$\text{HA: } \frac{x}{x^2} \rightarrow y=0$$

$$\text{x-int: set } y=0, 0=\text{num}$$

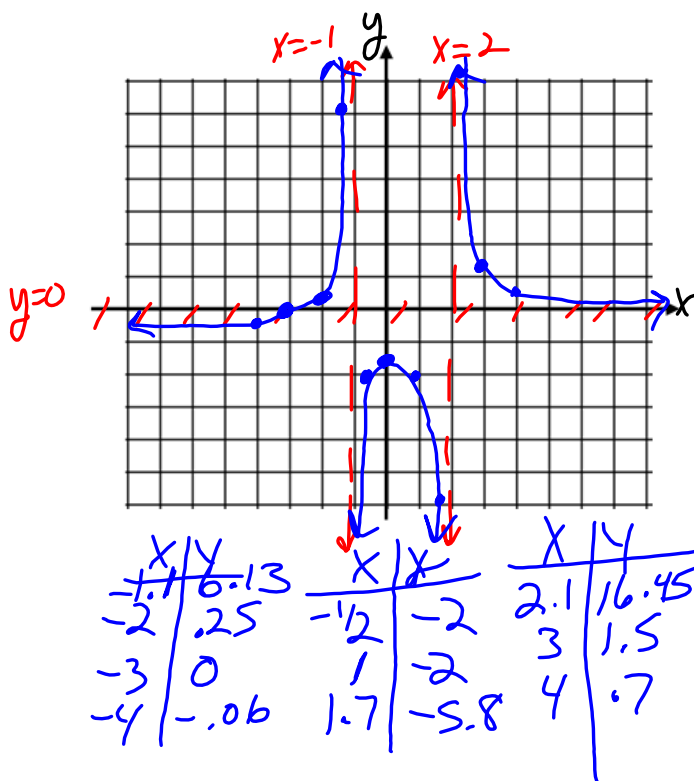
$$x+3=0 \quad (-3,0)$$

$$\text{y-int: set } x=0$$

$$y = \frac{0+3}{0^2-0-2} = -\frac{3}{2} \quad (0, -1.5)$$

$$\text{Cross? HA } 0 = \frac{x+3}{x^2-x-2} \rightarrow x=-3$$

$$\frac{0}{x^2-x-2} = \frac{x+3}{x^2-x-2} \quad (-3,0)$$



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

VA: $x^2 - 3x = 0$
 $x(x-3) = 0$
 $x=0 \mid x=3$

HA: $\frac{2x^2}{x^2} = 2 \rightarrow y=2$

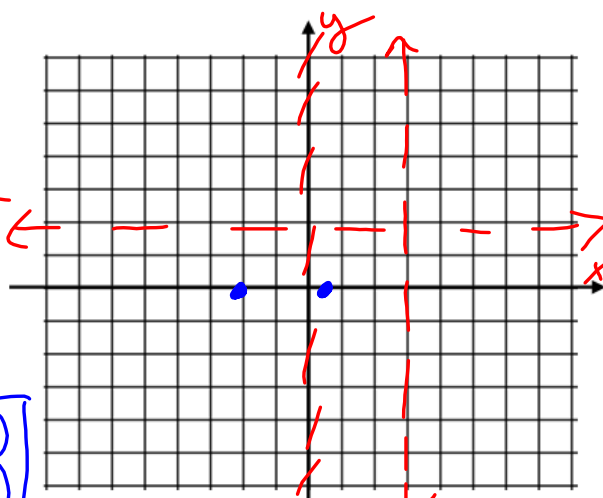
x-int: $2x^2 + 3x - 2 = 0$
 $2x^2 + 4x - x - 2 = 0$
 $2x(x+2) - 1(x+2) = 0$
 $(x+2)(2x-1) = 0$
 $x = -2 \mid x = \frac{1}{2}$

y-int: $x=0$
 $\frac{2(0)^2 + 3(0) - 2}{0^2 - 3(0)} = \frac{-2}{0}$
 undefined!
 NONE!

Cross?

$\textcircled{2} = \frac{2x^2 + 3x - 2}{x^2 - 3x}$

$2x^2 - 6x = 2x^2 + 3x - 2$
 $-9x = -2$
 $x = \frac{2}{9}$
 yes $(\frac{2}{9}, 2)$



x	y
-2	0
1/2	0
2/9	2

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

VA: $x^2 - 3x = 0$
 $x(x-3) = 0$
 $x=0, x=3$

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

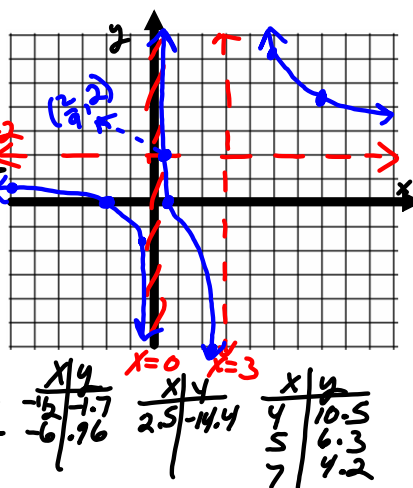
x-int: $0 = 2x^2 + 3x - 2$
 $(x+2)(2x-1) = 0$
 $x = -2, x = \frac{1}{2}$

y-int: $\frac{2(0)^2 + 3(0) - 2}{0^2 - 3(0)} = \frac{-2}{0}$
 undefined!
 no y-intercepts

no y-intercepts

Cross HA? $HA = ER$
 $2 = \frac{2x^2 + 3x - 2}{x^2 - 3x}$

$2x^2 - 6x = 2x^2 + 3x - 2$
 $-9x = -2$
 $x = \frac{2}{9}$
 $(\frac{2}{9}, 2)$



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

Ditto 3.1: 1, 2

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Oct 30-3:30 PM