

Rational Function: $\frac{\text{polynomial}}{\text{polynomial}}$	Example: $\frac{1}{x}, \frac{2x+4}{x+7}, \frac{x^2+3x}{x-10}, \text{etc.}$
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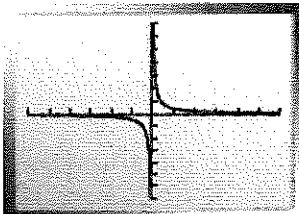
State the excluded value for each function.

Example 1: $f(x) = \frac{5}{x-2}$
 $x \neq 2$

2. $y = \frac{-3}{x+8}$
 $x \neq -8$

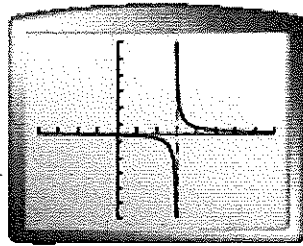
3. $y = \frac{3}{x+7}$
 $x \neq -7$

Noticing Patterns in Graphs



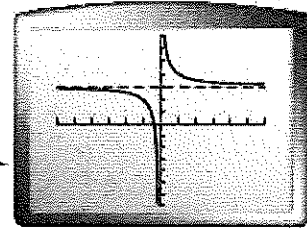
$y = \frac{1}{x}$

asymptotes:
 $y=0$
 $x=0$ (excluded value)



$y = \frac{1}{x-3}$

asymptotes:
 $y=0$
 $x=3$ (excluded value)



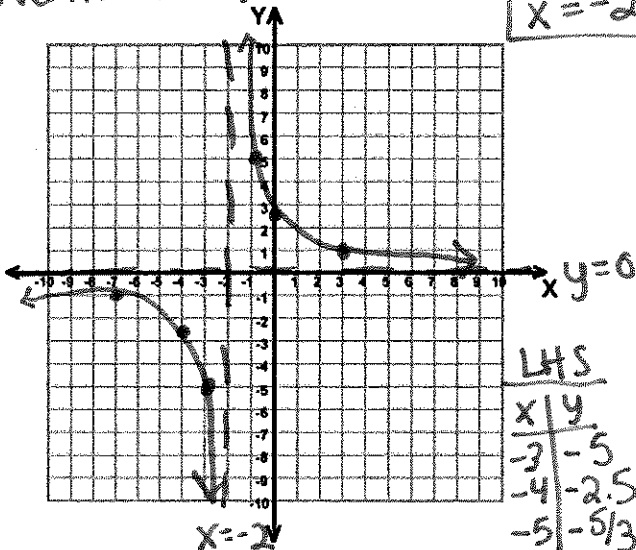
$y = \frac{1}{x} + 3$

asymptotes:
 $y=3$ (vertical shift)
 $x=0$ (excluded value)

Asymptote: line in which the graph approached but never touches
 (y = vertical shift, x = excluded value)
 Identify the asymptotes (Box answer). Graph the function.

Example 2: $y = \frac{5}{x+2}$
 no vertical shift, $x \neq -2$

asymptotes:
 $y=0$
 $x=-2$



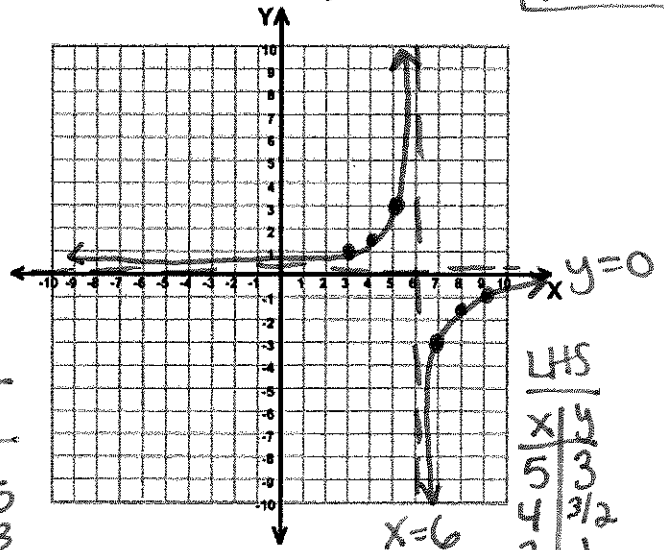
LHS	
x	y
-3	-5
-4	-2.5
-5	-5/3
-6	-5/4
-7	-1

RHS	
x	y
-1	5
0	2.5
1	5/3
2	5/4
3	1



4. $h(x) = \frac{-3}{x-6}$
 no vertical shift, $x \neq 6$

asymptotes:
 $y=0$
 $x=6$



LHS	
x	y
5	3
4	3/2
3	1

RHS	
x	y
7	-3
8	-3/2
9	-1



Identifying Asymptotes

$$y = \frac{a}{x-b} + c$$

$x=b$ vertical asymptote
 $y=c$ horizontal asymptote

Example:

$$y = \frac{1}{x+4} + 1$$

$x=-4$ vertical asymptote
 $y=1$ horizontal asymptote

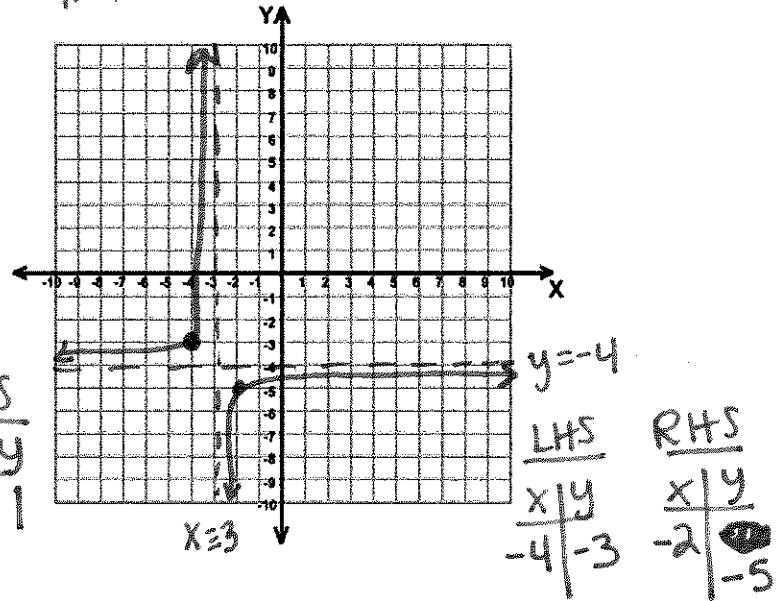
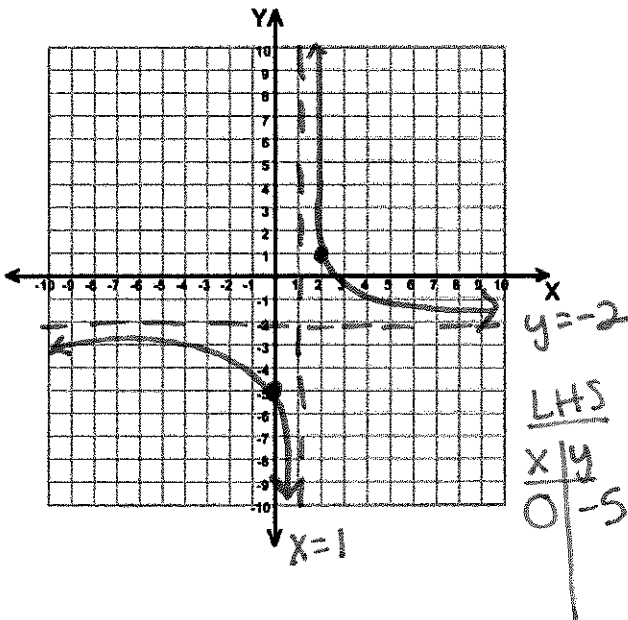
Example 3:

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

$x=1$
 $y=-2$

$$5.. y = \frac{-1}{x+3} - 4$$

$x=-3$
 $y=-4$



Example 5:

Dancing Your dance club sponsors a contest at a local reception hall. Reserving a private room costs \$350, and the cost will be divided equally among the people who enter the contest. Each person also pays a \$30 entry fee.

A What equation gives the total cost per person y of entering the contest as a function of the number of people x who enter the contest? $y = \frac{350}{x} + 30$

B What is the graph of the function in part (A)? Use the graph to describe the change in the cost per person as the number of people who enter the contest increases. *in textbook*



C Approximately how many people must enter the contest in order for the total cost per person to be about \$50?

$$50 = \frac{350}{x} + 30$$

$$20 = \frac{350}{x}$$

$x = 17.5$
 $x \approx 18$ people