Sec 3.5.4
Finding slant asymptotes...
....and graphing

A slant asymptote only exists if the degree of the numerator is exactly ONE more than the degree of the denominator.

(note, a horizontal asymptote will not exist)

We will determine them
using long or synthetic division.

A graph *can* cross a slant and horizontal asymptote. A graph *cannot* cross a vertical asymptote, ever, because these are "bad spots" in the domain.

Find the slant asymptote of-

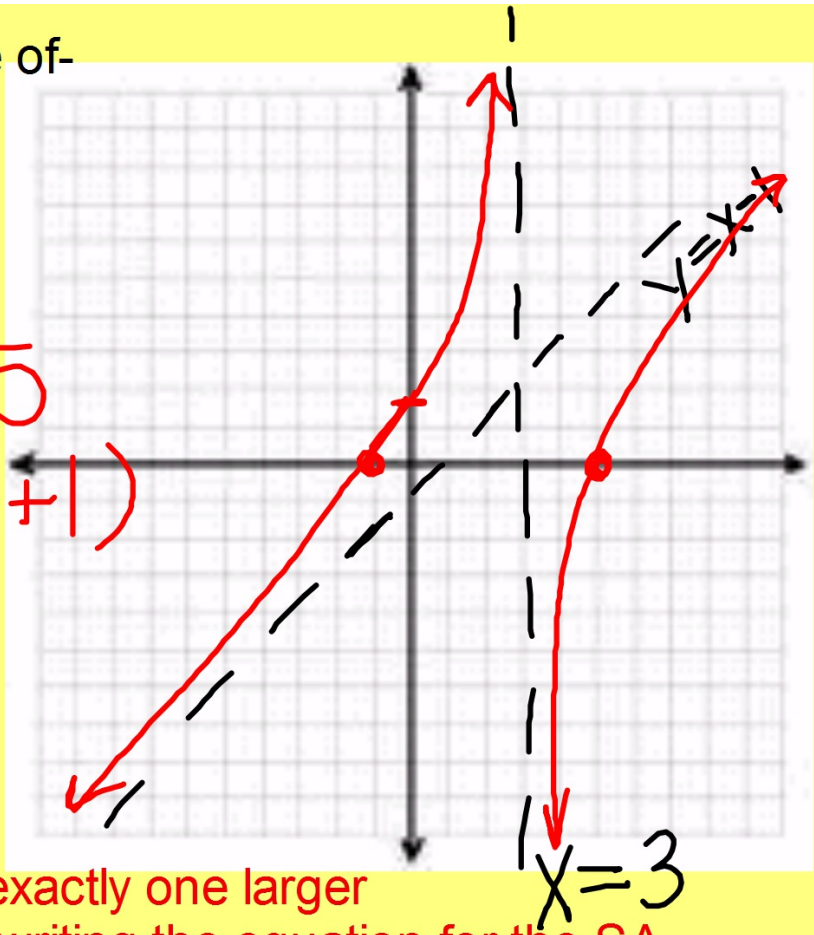
(to graph, also find all intercepts)

$$f(x) = \frac{x^2 - 4x - 5}{x - 3}$$

$0 = x^2 - 4x - 5$

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

$x = 5, -1$



*degree in numerator is exactly one larger

*ignore remainder when writing the equation for the SA

Find the slant asymptote and graph-

$(x+1)(x-1)$

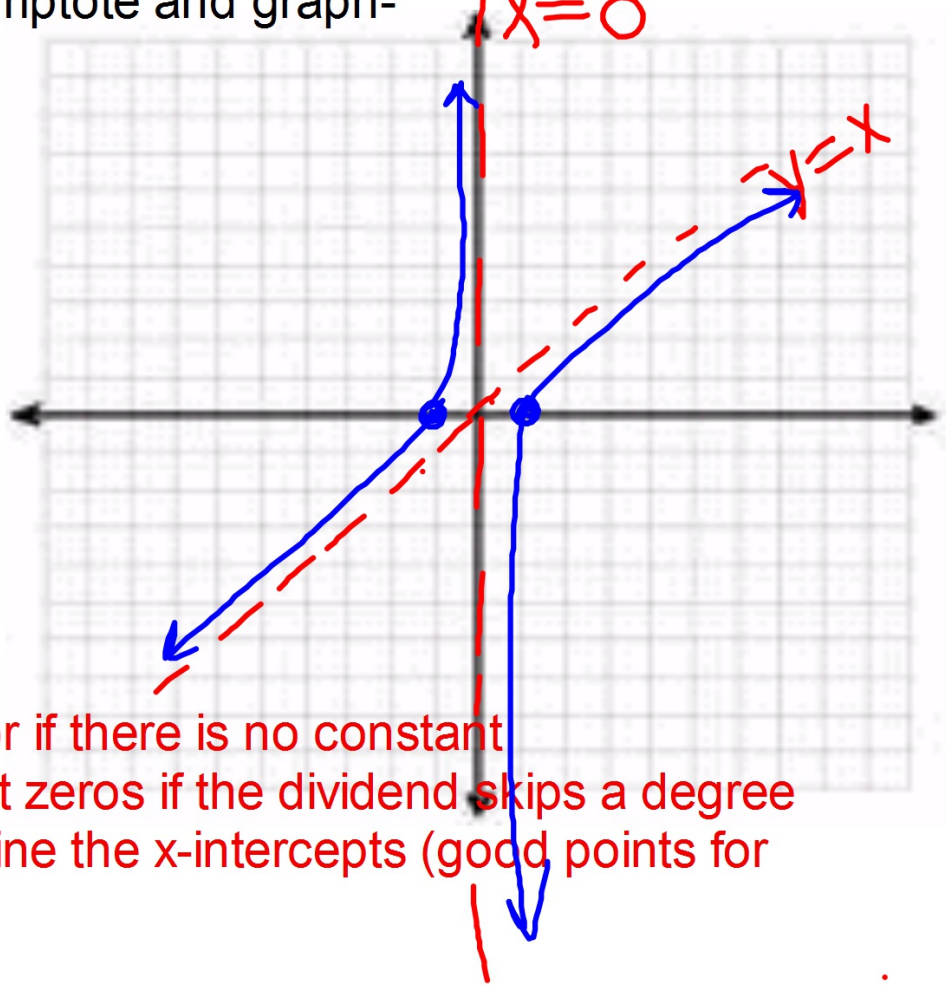
$f(x) = \frac{x^2 - 1}{x+0}$

$x = 0$

$y = x$

$0 = x^2 - 1$

$1 = x^2$



*use 0 as the divisor if there is no constant

*remember to insert zeros if the dividend skips a degree

*let y = 0 to determine the x-intercepts (good points for this function)

Graph-

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

$y = x$

$x^2 - 1 \overline{)\, x^3 + 0x^2 + 0x + 0}$

$-(x^3 \quad - x)$

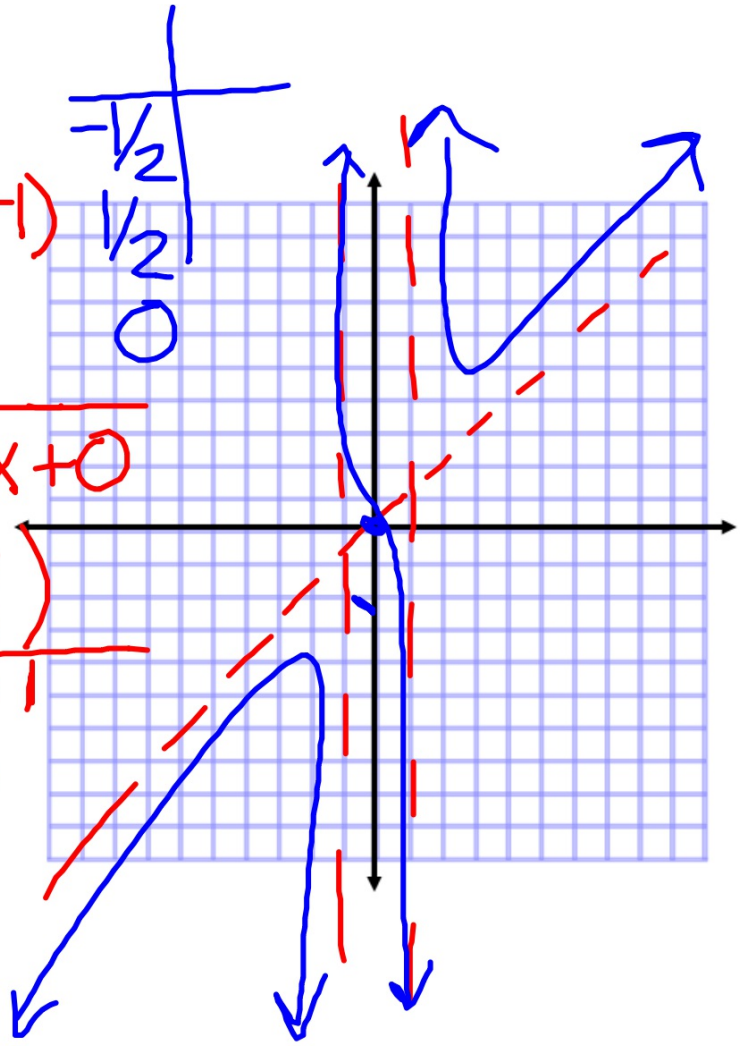
x

$0 = \frac{0}{0-1}$

$-1/2$

$1/2$

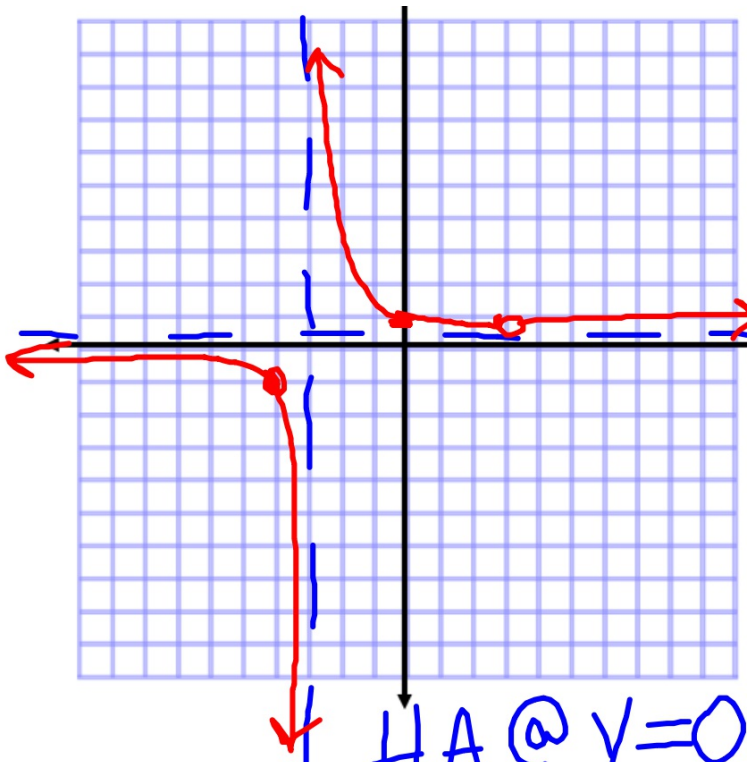
0



Graph $f(x) = \frac{x-3}{x^2-9}$

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

x	y
0	1/3
-5	-1/2



HA @ y = 0

VA @ x = -3

hole @ x = 3

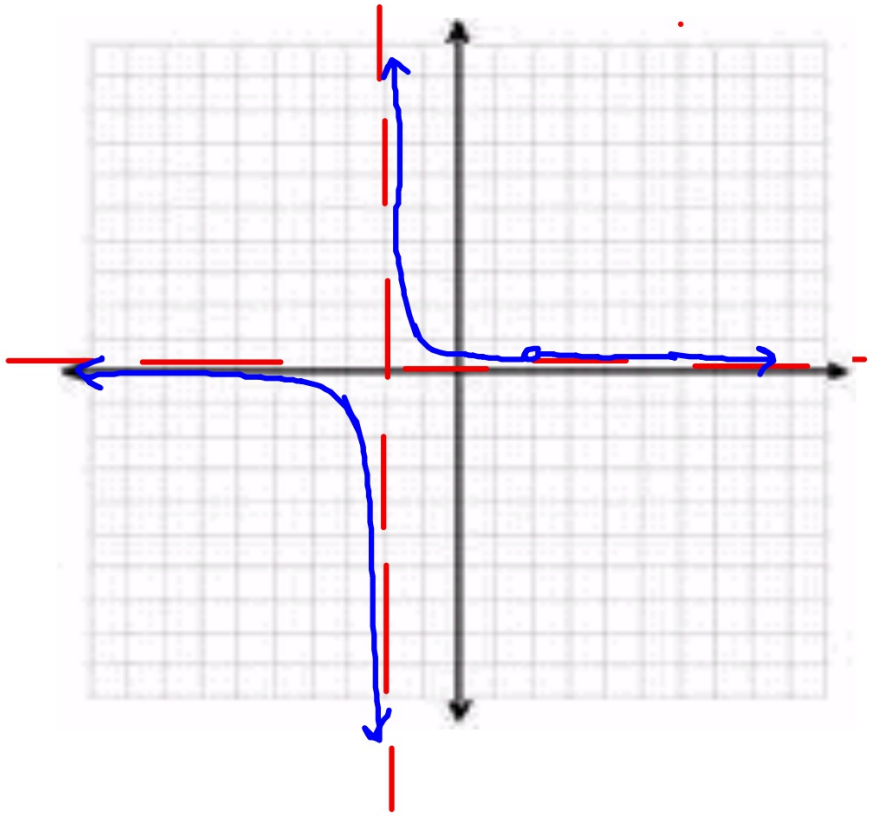
Suggested Practice

Sec 3.5
page 407
73,83,85,87

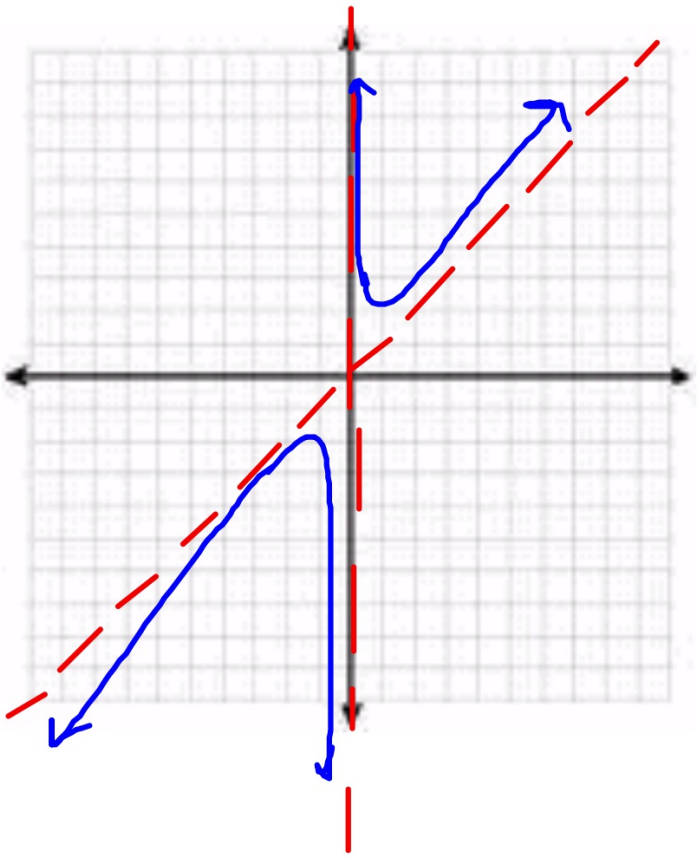
When graphing, show work for slant asymptotes and intercepts. Clearly label a point on each side of every vertical asymptote (or have a table).Test points and other details can be gleaned from the graphing calculator.

73.

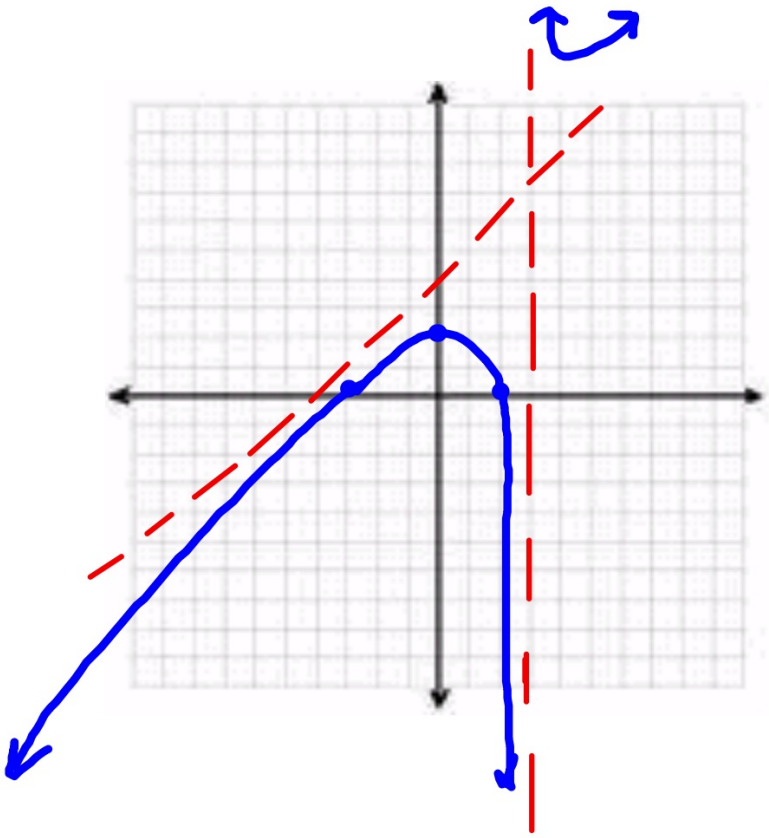
VA @ x = -2
HA @ y = 0
hole at x = 2
y-int: (0,½)
other points-
(-3,-1)
(-1,1)



83.
VA @ x = 0
no HA
SA @ y = x
other points:
(1,2)
(-1,-2)
no intercepts



85.
VA @ x= 3
no HA
SA at y = x+4
y-int @ (0,2)
x-int @ (-3,0)
(2,0)
other point-
(4,14)



87.
VA @ x = 0
x = -2
SA @ y = x-2
no y-intercepts
x-intercept
@ (-1,0)
other points:
(1, 2/3)
(-4, -63/8)