Sec 3.5
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 synthetic division.

Find the slant asymptote of-

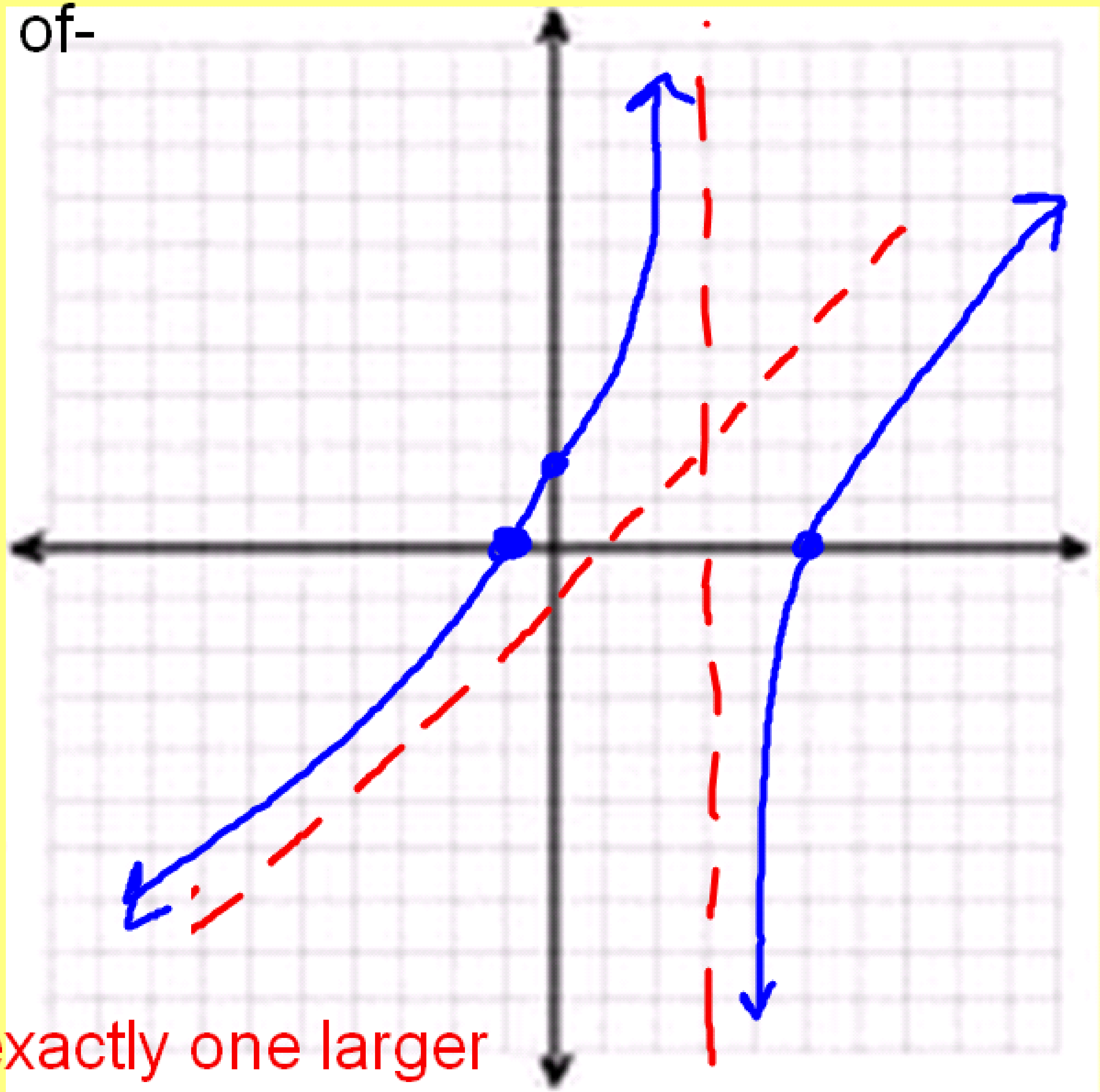
$$f(x) = \frac{x^2 - 4x - 5}{x - 3}$$

x	y
0	+5/3

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

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

$x = 5 \; \& \; -1$



*degree in numerator is exactly one larger

*ignore remainder when writing the equation for the SA

Find the slant asymptote and graph-

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

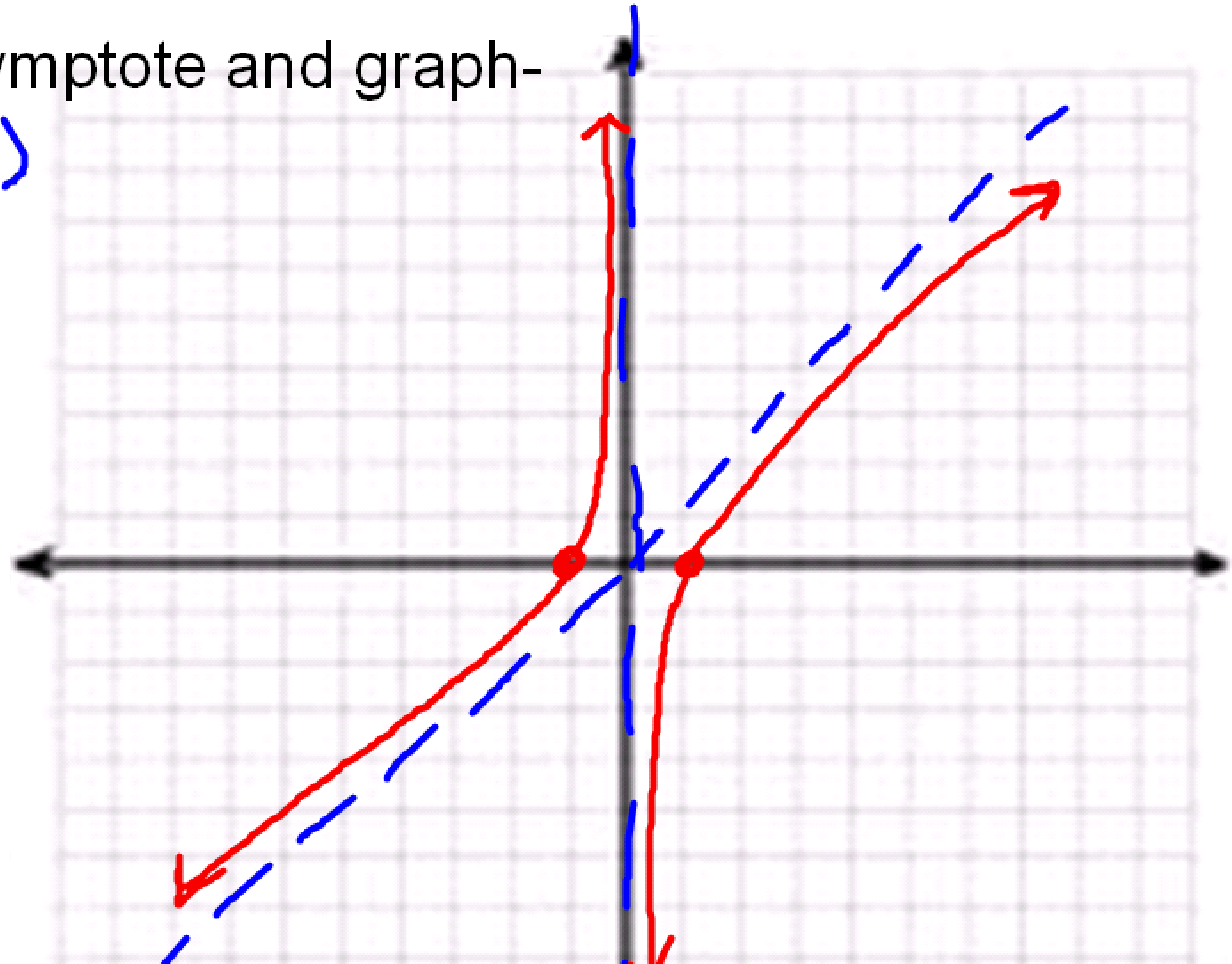
$$f(x) = \frac{x^2 - 1}{x}$$

VA @ $x=0$

$0 = x^2 - 1$

$1 = x^2$

$\pm 1 = x$

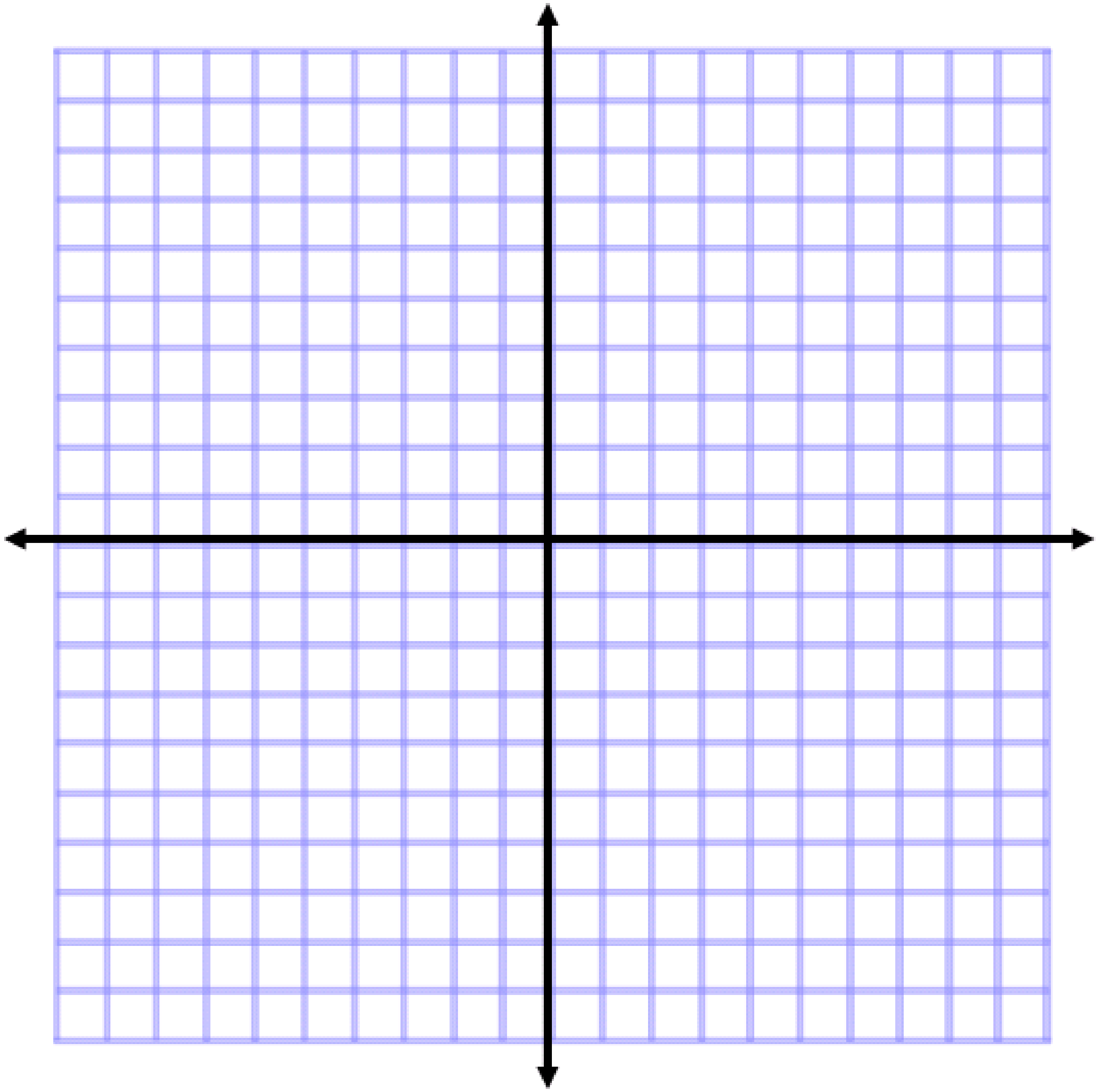


*use 0 as the divisor if there is no constant

*remember to insert zeros if the dividend skips a degree

Graph-

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



Graph $f(x) = \frac{x-3}{x^2-9} = \frac{\cancel{x-3}}{(x+3)\cancel{(x-3)}} = \frac{1}{x+3}$

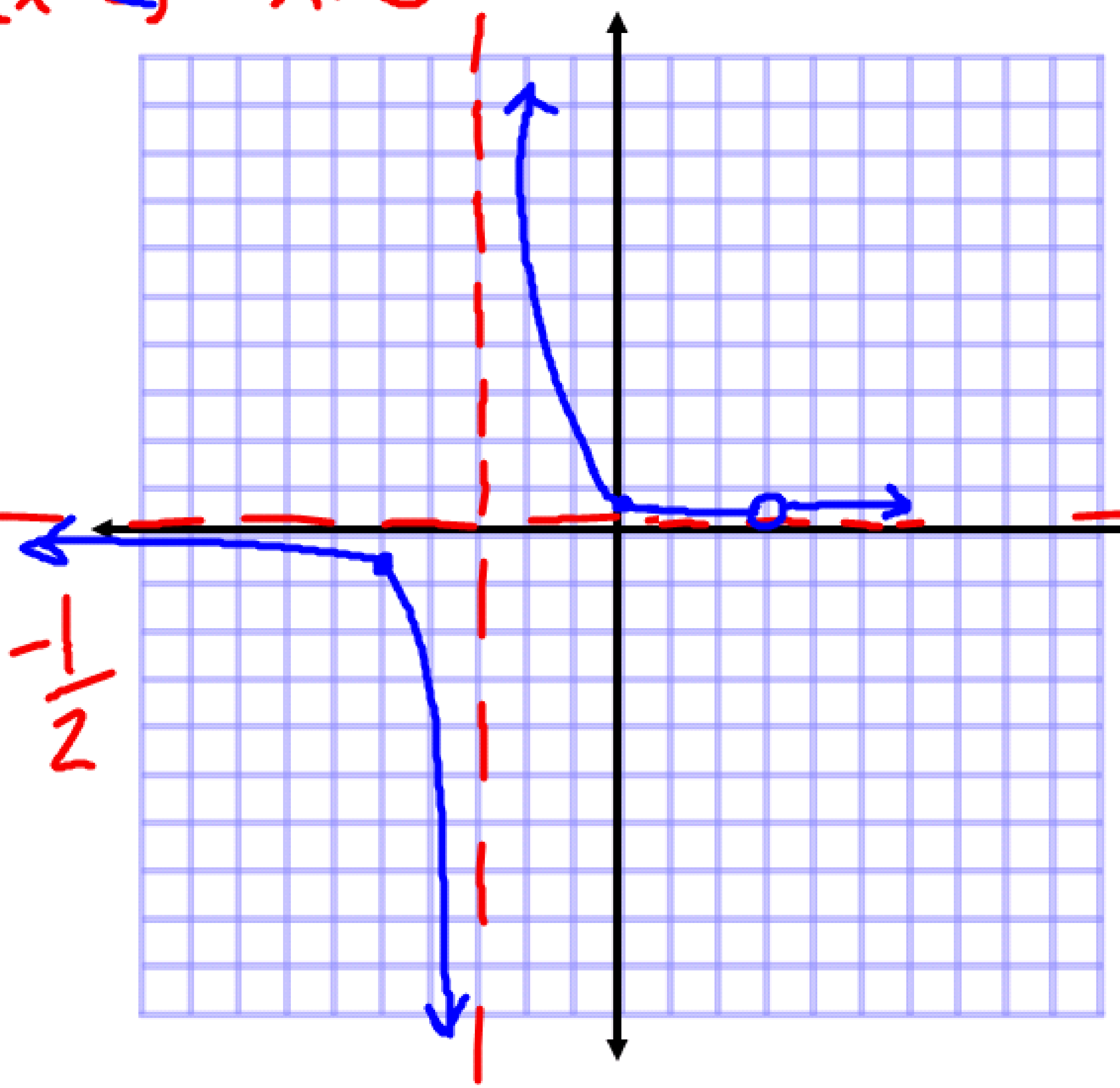
hole @ $x=3$

VA @ $x=-3$

HA @ $y=0$

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

$\frac{-8}{16} = \frac{-1}{2}$



Suggested Practice

Sec 3.5
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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.

83.

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

$y=0$

$0=x^2+1$

$-1=x^2$

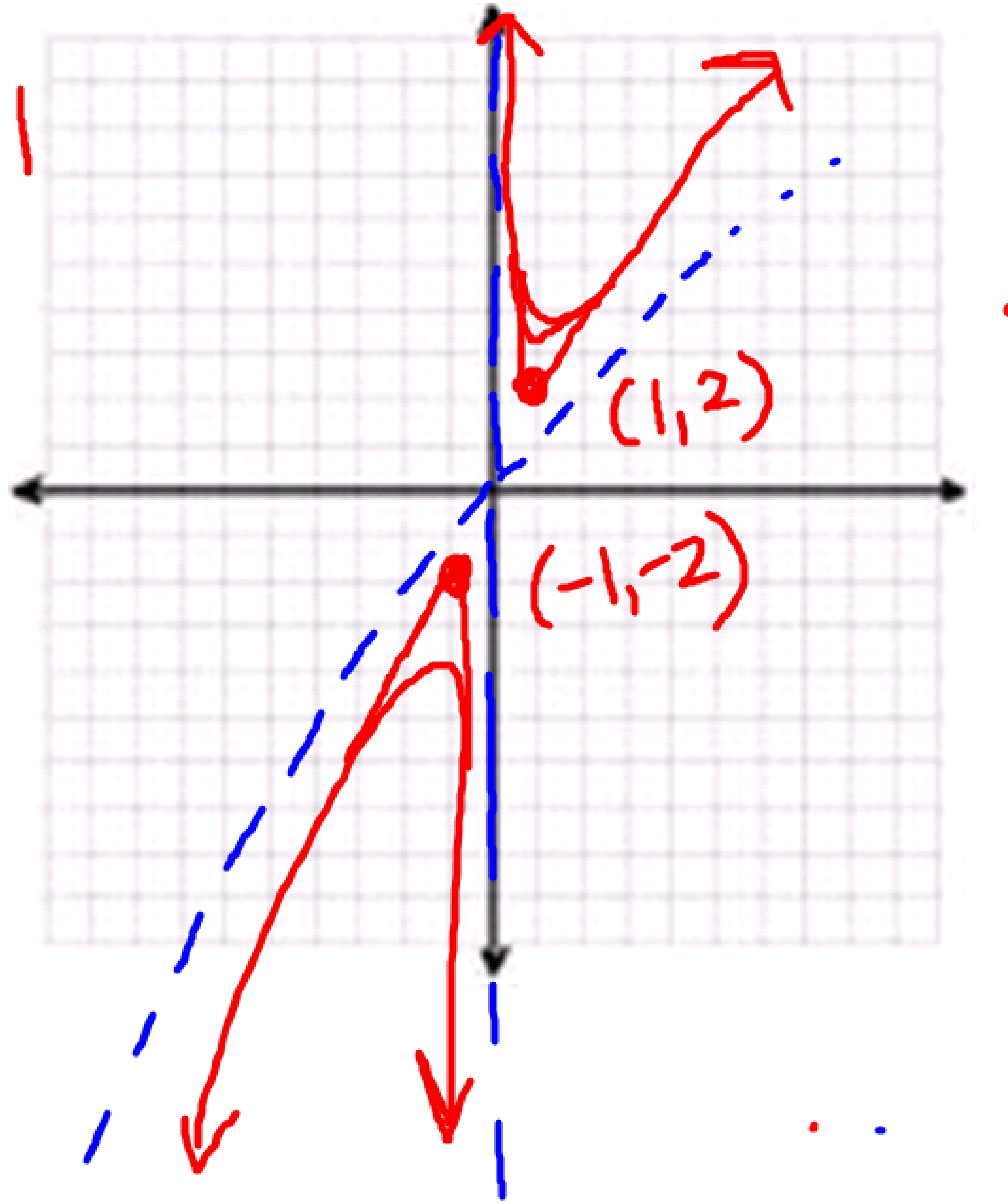
$\cancel{\varnothing}$

VA @ $x=0$

HA $\cancel{\varnothing}$

SA @ $y=x$

$x=0$ (y-$\cancel{\text{int}}$) $\frac{1}{0}$ und.



85.

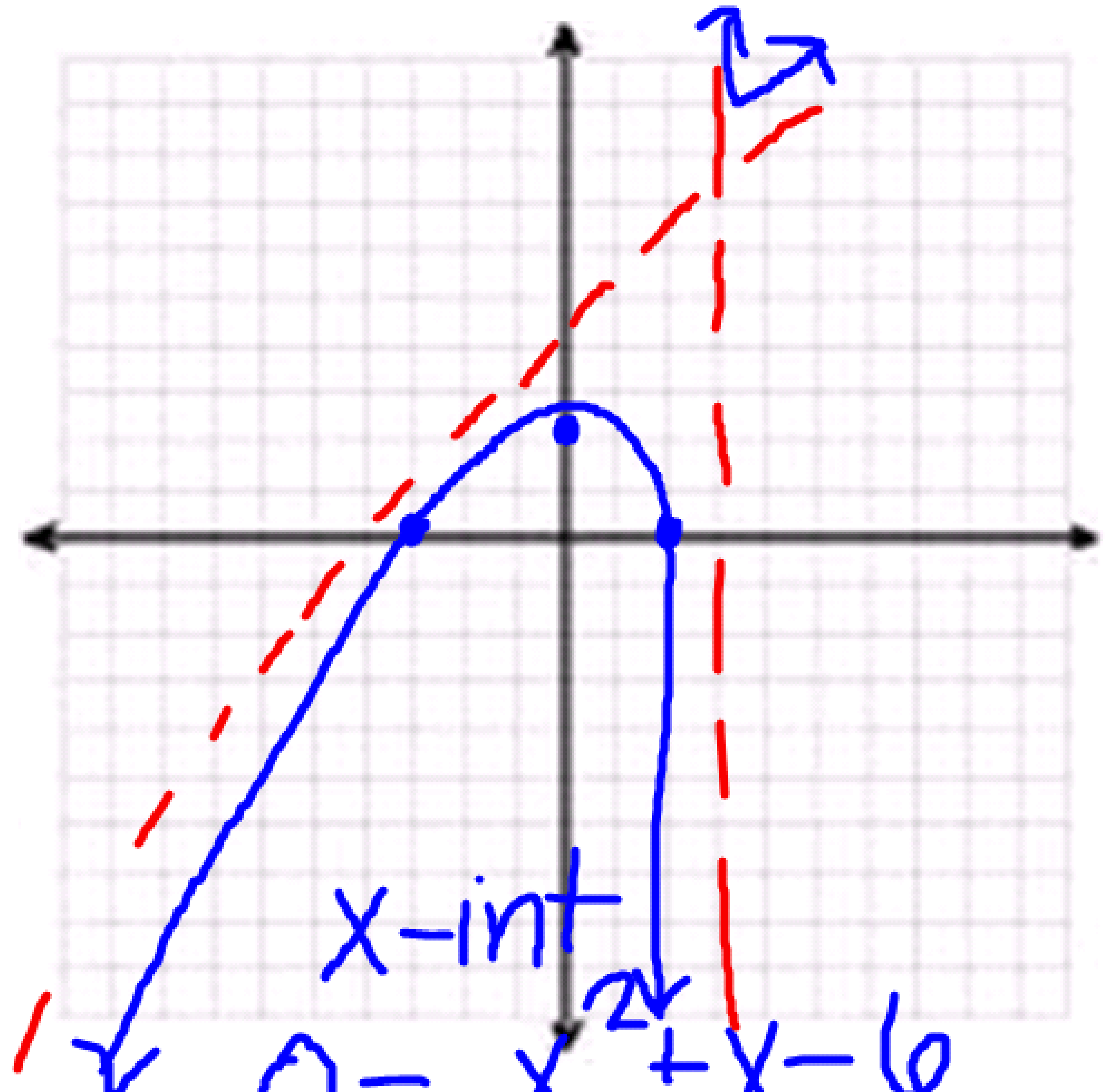
$$\frac{x^2+x-6}{x-3}$$

VA @ $x=3$

HA $\varnothing$

SA $y=x+4$

y-int @ 2



x-int

$0=x^2+x-6$

$0=(x+3)(x-2)$

$x=-3$ & 2

87.

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

SA @ $y = x-2$

VA @ $x=0$

$x=-2$

$x(x+2)$

$\frac{1}{0}$

no y-int

x-int
Let $y=0$

$0 = x^3+1$

$-1 = x^3$

$-1 = x$