

## 4.4 Graphing Rational Functions

1. Determine vertical asymptote(s) (denominator = 0)
2. Determine horizontal asymptote
3. Determine  $x/y$ -intercepts and holes if any
4. Make a table of values
  - Choose  $x$ -values close to vertical asymptotes, and one large positive and negative value of  $x$ .
5. Draw a smooth curve through the points

① Graph  $f(x) = \frac{x^2 + x - 2}{x^2 + x - 12}$

$$y = \frac{(x+2)(x-1)}{(x+4)(x-3)}$$

Vert. Asym  $x = -4, x = 3$

Horiz. Asym -

$$y = 1$$

No Holes

(Nothing Cancels)

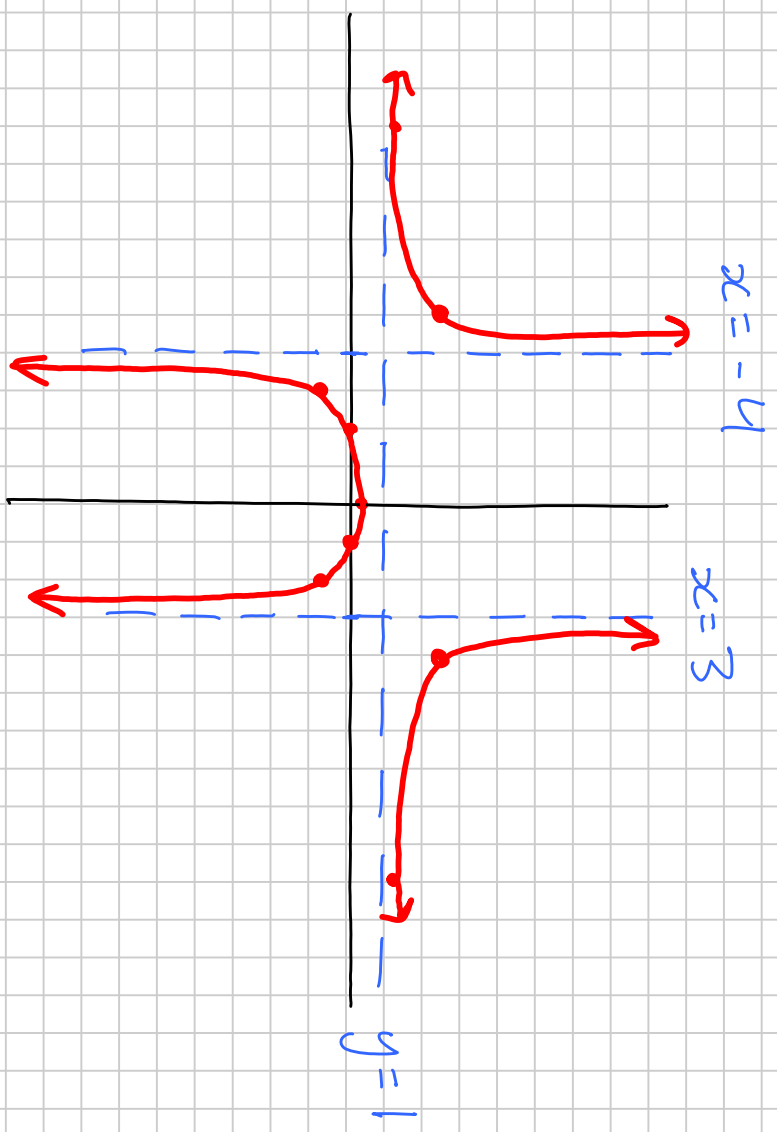
x-int:  $\bigcirc = (x+2)(x-1)$

$$x = -2, x = 1$$

y-int:  $y = \frac{-2}{-12}$

$$y = \frac{1}{6}$$

$x$	-5	-3	2	4	-10	10
$y$	2.25	-0.7	-0.7	2.25	1.1	1.1



② Graph  $f(x) = \frac{4x^2 - 1}{2x^2 + 5x - 3}$

$$2x^2 + 6x - x - 3$$
$$2x(x+3) - 1(x+3)$$
$$(2x-1)(x+3)$$

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

$$\rightarrow y = \frac{2x+1}{x+3}$$

Vert. Asym  $x = -3$

Horiz. Asym  $y = \frac{4}{2} = 2$

Hole -

$$\left(\frac{1}{2}, \frac{4}{3}\right)$$

or

$$(0.5, 0.5\bar{7})$$

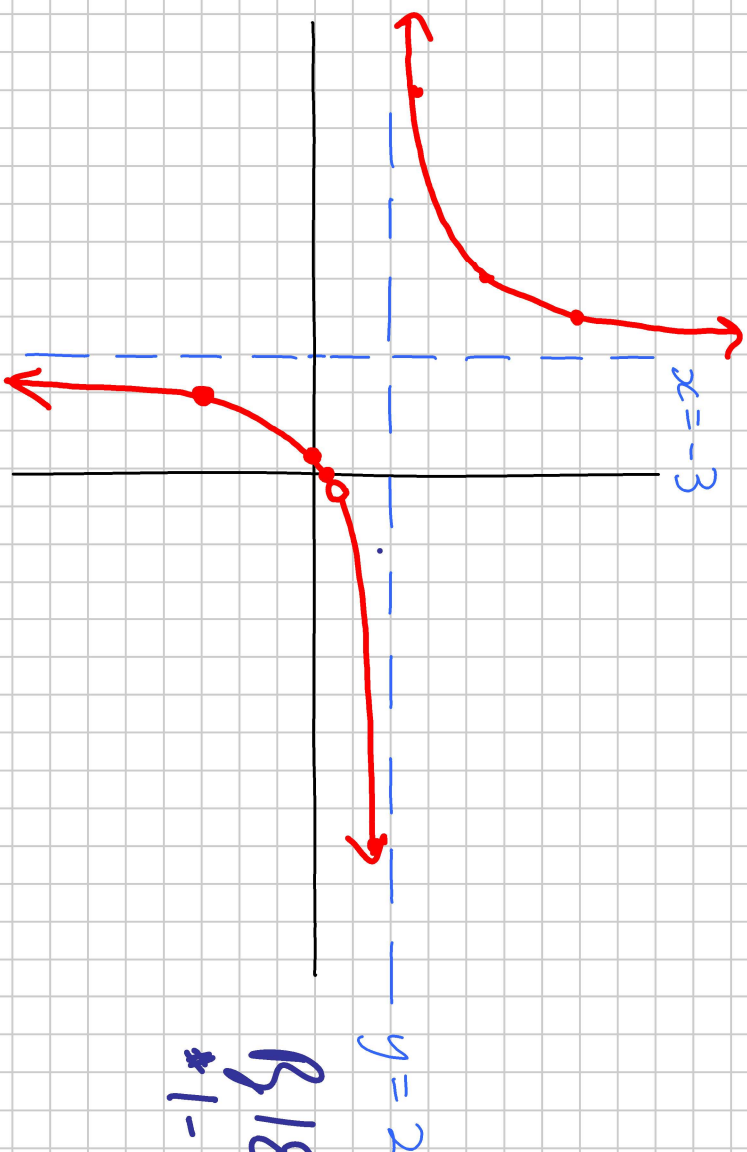
x-int:  $0 = 2x+1$

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

y-int:  $y = \frac{1}{3}$

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

$x$	-4	-2	-10	10	-5
$y$	7	-3	2.7	1.6	4.5



$\mathbb{R} \setminus \{-3\}$   
 $* (-6, \infty)$