

Step 2: Cancel common factor(s) if any.

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

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

← Simplified expression.

Step 4: Set denom. of Simplified expression equal 0 to find the vertical asymptotes.

$$x-2=0 \rightarrow \boxed{x=2}$$

$$\text{So, VA. : } \boxed{x=2}$$

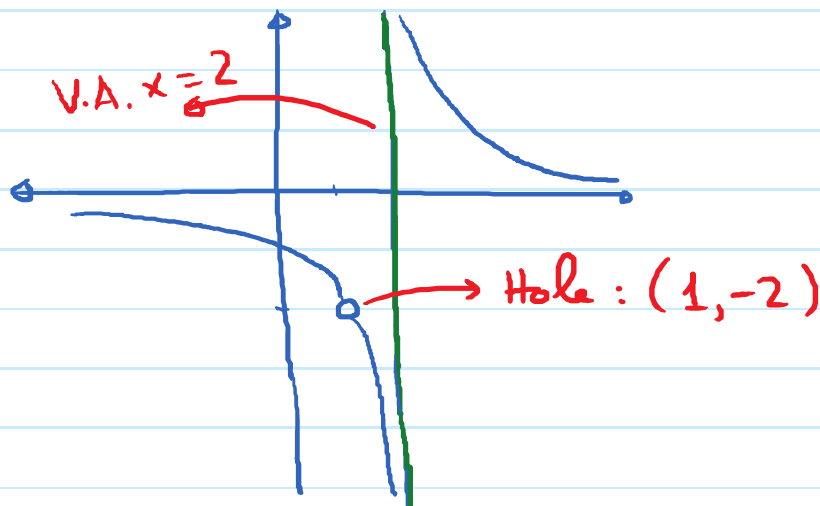
Step 5: Set the canceled factor = 0 to solve for the x-coordinate(s) of the hole in graph.

$$x-1=0 \rightarrow \boxed{x=1} \rightarrow \text{x-coord. of hole.}$$

Step 6: To find y-coordinate of a hole, we plug the x-coord. of the hole into the simplified expression.

$$x = 1 \rightarrow \frac{x+1}{x-2} \rightarrow \frac{1+1}{1-2} = \frac{2}{-1} = -2.$$

Hole: $(1, -2)$



E.g. Find the V.A. and hole(s) if any of the given function.

$$f(x) = \frac{x^2 - 5x + 6}{x^2 - x - 2}$$

Step 1: Factor

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

Step 2: Cancel

$$f(x) = \frac{(x-3)\cancel{(x-2)}}{(x+1)\cancel{(x-2)}} = \boxed{\frac{x-3}{x+1}} \quad \text{Simplified}$$

Step 3: V.A.

$$x + 1 = 0 \rightarrow \boxed{x = -1} \rightarrow \text{V.A.}$$

Step 4: x-coord. of hole:

$$x - 2 = 0 \rightarrow \boxed{x = 2} \rightarrow \text{x-coord. of hole}$$

Step 5: y-coord. of hole.

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

$$\rightarrow \text{Hole: } \boxed{\left(2, -\frac{1}{3}\right)}$$

Process for graphing rational functions $f(x) = \frac{p(x)}{q(x)}$

Step 1: Find x-intercept(s)

Set num. $p(x) = 0 \rightarrow$ Solve for x

Step 2: Find y-intercept.

Plug $x = 0$ into f .

Step 3: Find H.A., V.A., Hole(s) if any.

Step 4: Plot more points (if necessary)
by making a T-table

Step 5: Sketch the graph.

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

Find x-intercept(s), y intercept, H.A., V.A.,
hole (if any) and sketch the graph.

* x-intercept

$$\text{Set num } x+1=0 \rightarrow x=-1$$

$$\rightarrow \text{x-intercept: } (-1, 0)$$

* y-intercept:

$$\text{Plug } x=0 \text{ into } f: \frac{0+1}{0-4} = -\frac{1}{4}$$

$$\rightarrow \text{y-intercept: } (0, -\frac{1}{4})$$

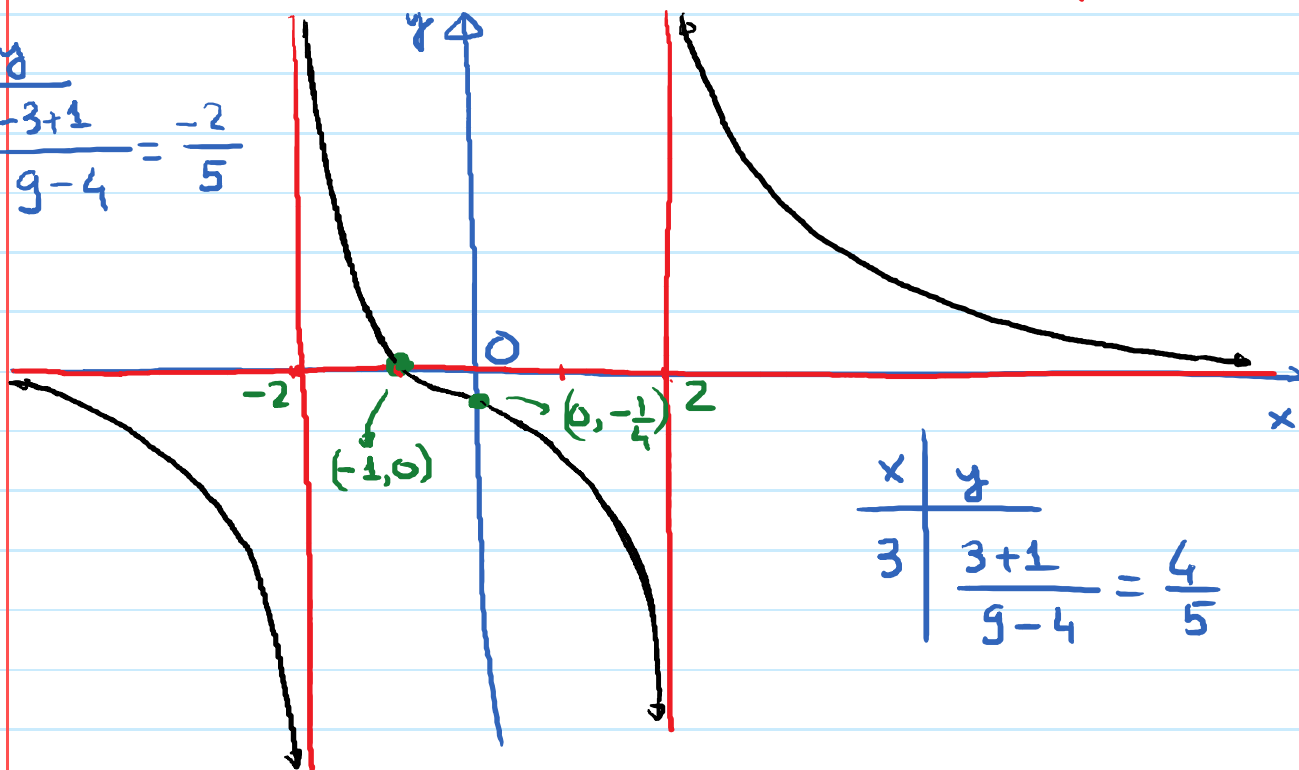
* H.A. $y=0$. (degree top < degree bottom)

* V.A. $\frac{x+1}{(x-2)(x+2)}$

Set $(x-2)(x+2) = 0 \rightarrow x = 2; x = -2$

V.A.

x	y
-3	$\frac{-3+1}{9-4} = \frac{-2}{5}$



x	y
3	$\frac{3+1}{9-4} = \frac{4}{5}$