

Rational Functions

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

$$\text{VA } \underline{x = -1} \quad \begin{array}{l} x+1=0 \\ x = -1 \end{array}$$

$$\text{HA } \underline{y = 2} \quad \frac{2001}{1001}$$

↑
non-vertical asymptote
(NVA) ← $(-\frac{1}{2}, 0)$

$$0 = \frac{2x+1}{x+1}$$

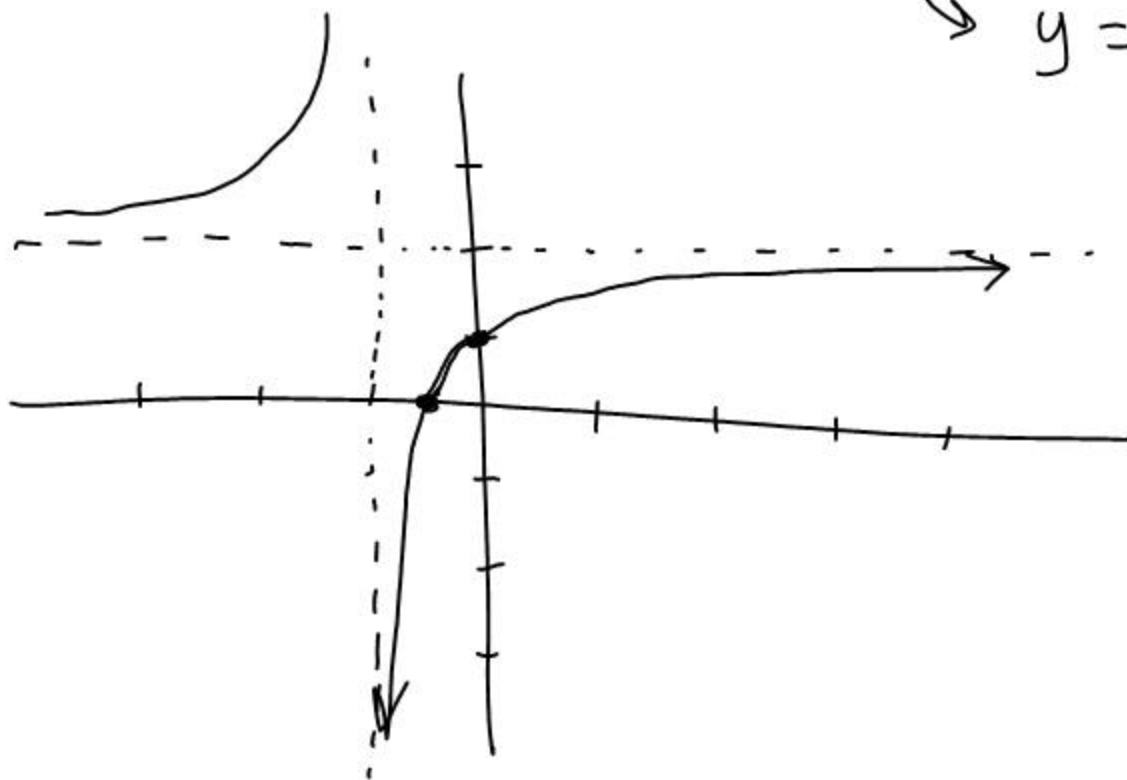
$$0 = 2x+1$$

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

$$x\text{-int } \underline{-\frac{1}{2}}$$

$$y\text{-int } \underline{1} \quad (0, 1)$$

$$\rightarrow y = \frac{2(0)+1}{0+1} = 1$$



Ex. $y = \frac{x+2}{x^2-1}$

VA $x = \pm 1$

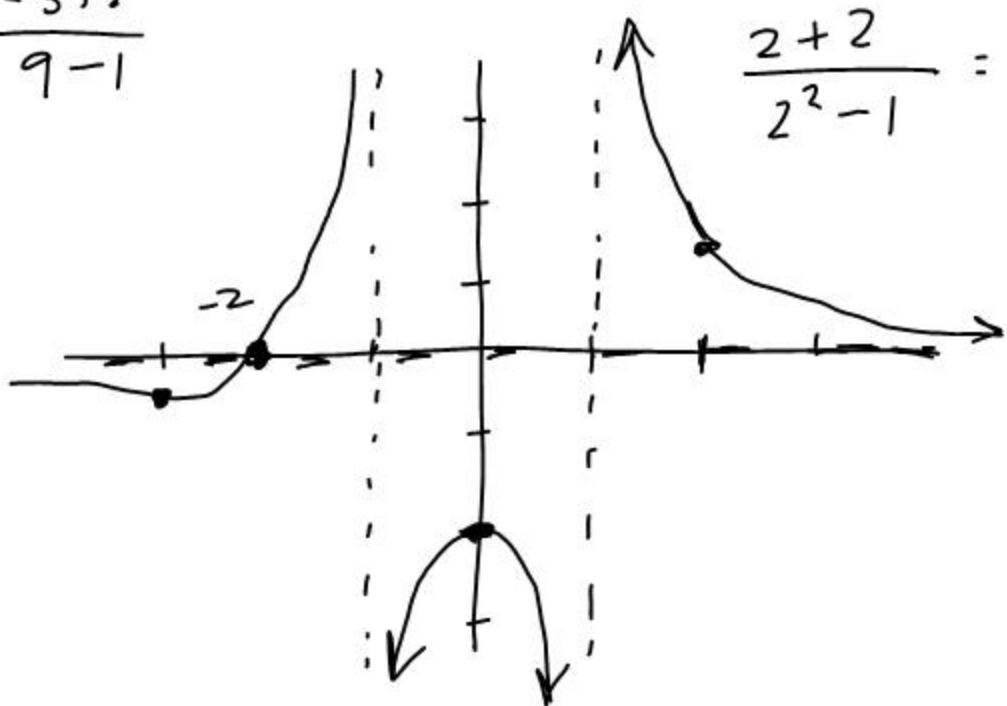
HA $y = 0$

x-int -2

y-int -2

$\frac{-3+2}{9-1}$

$\frac{2+2}{2^2-1} = \frac{4}{3}$



$\frac{1002}{1,000,000-1}$

$\frac{1,000,002}{100,000,000,000,000}$

$100,000,000,000,000$

If the larger power is in the denominator the HA is $y=0$

Ex. $y = \frac{1x^2 + 4x + 4}{1x^2 - 1}$

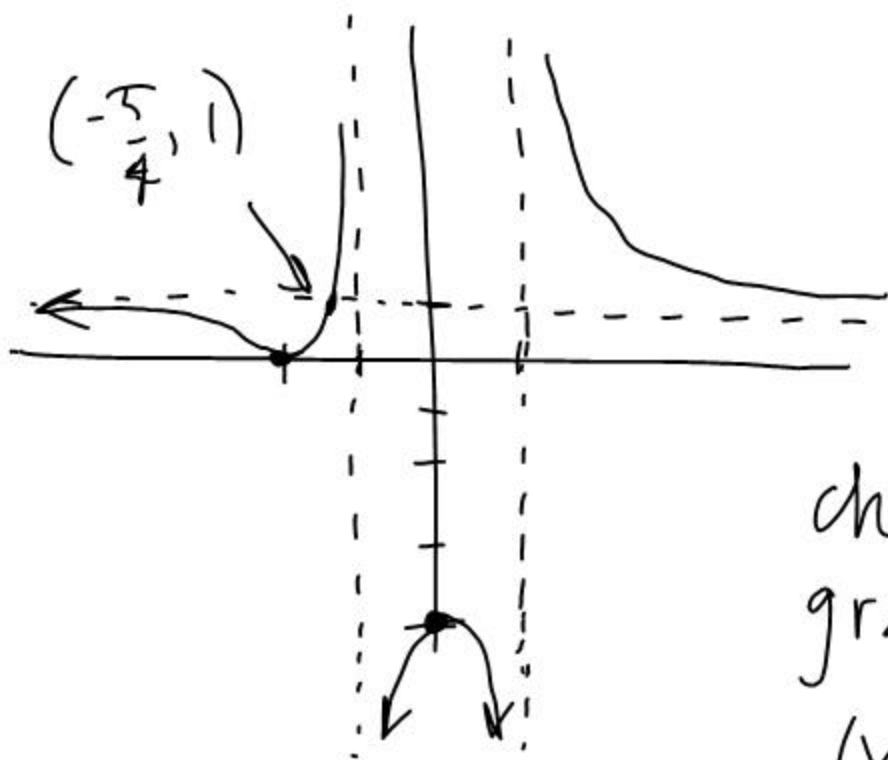
VA $\underline{x = \pm 1}$

HA $\underline{y = 1}$

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

x-int $\underline{-2}$

y-int $\underline{-4}$



If the top + bottom powers are equal, the HA is the ratio of leading coefficients

check to see if the graph crosses the HA

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

$$\cancel{x^2} + 4x + 4 = \cancel{x^2} - 1$$

$$4x = -5$$

$$x = -\frac{5}{4}$$

Ex. $y = \frac{x^2 - 4}{x + 1}$

VA $x = -1$

NVA $y = x - 1$

x-int ± 2

y-int -4

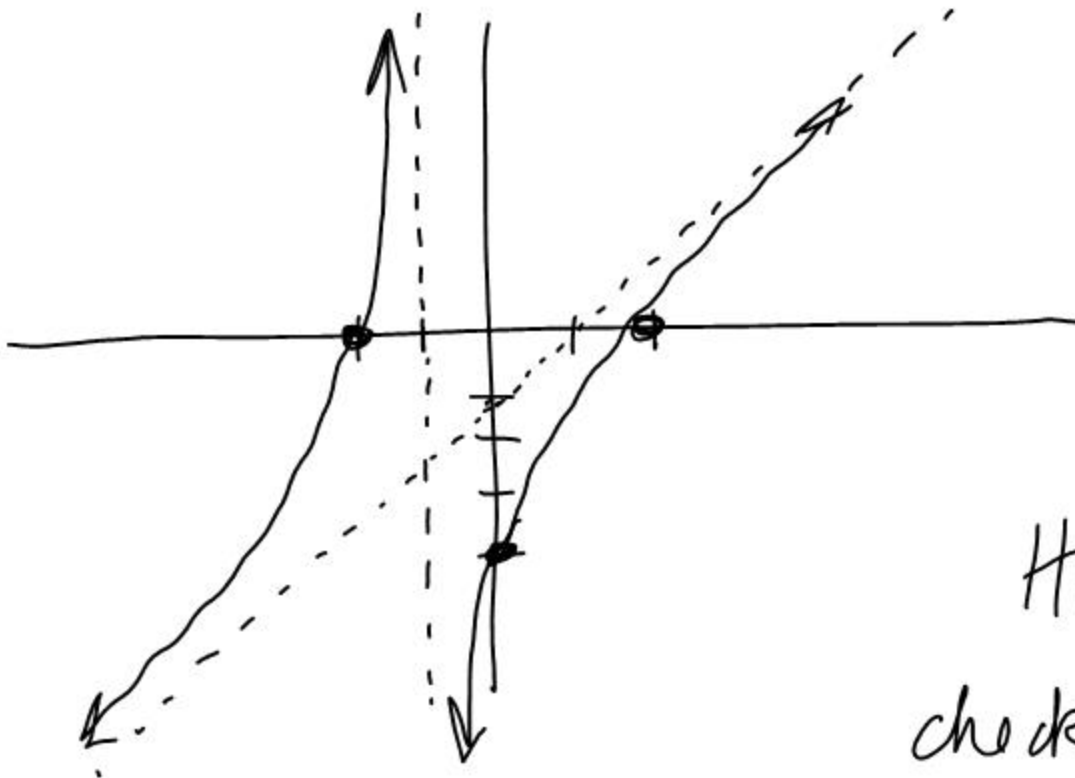
$x - 1 - \frac{3}{x + 1}$

If the bigger power is on top, do long division to get the NVA

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

$$\begin{array}{r} x+1 \overline{) x^2 - 4} \\ \underline{-x^2 + x} \\ -x - 4 \end{array}$$

$$\begin{array}{r} -x - 4 \\ \underline{+x + 1} \\ -3 \end{array}$$



HW

check the website