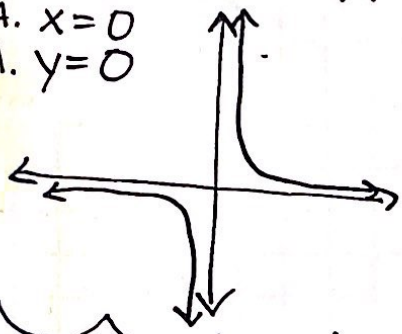
TIPS FOR GRAPHING RATIONALS

Parent → $y = \frac{1}{x}$

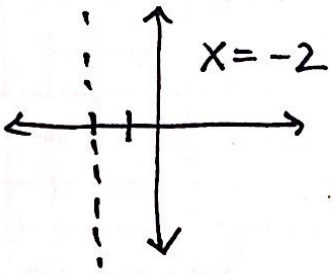
V.A. $x = 0$

H.A. $y = 0$

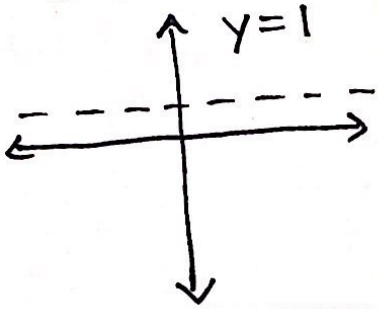


What is an asymptote?
A value that the curve approaches but never actually reaches.

Vertical



Horizontal



SHIFTS

- Stretch/Shrinks
- Negative (-) Flips

Flips Quadrants

$$y = \frac{a}{x-h} + k$$

H.A.

+ up
− down
*horizontal asymptote
$y =$

+ Left
− Right
vertical asymptote
$x =$

Domain + Range Notation

Vertical = Domain
① $x \neq \#$
② $(-\infty, \#) \cup (\#, \infty)$

Horizontal = Range
① $y \neq \#$
② $(-\infty, \#) \cup (\#, \infty)$

ALWAYS FACTOR FIRST!

→ look @ original problem ←

Finding Shifts given an equation

Vertical Shift

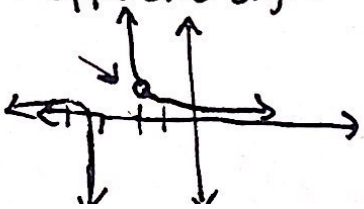
$x =$

find in denominator
holes NOT included
opposite sign
ex: $\frac{1}{x-2}$
V.A at $x = 2$
* shifts right 2

Holes in the function

ex: $\frac{(x+2)(x-1)}{(x+2)(x+3)}$

Hole @ $x = -2$
* opposite sign



Horizontal Shift

① $+k$ ex: $\frac{1}{x} + 3$ shifts up 3
* keep sign
H.A. at $y = 3$

② a) $y = \#$ → highest exp. the same
ex: $\frac{1x^{②} + 2x}{2x^{②} + 1}$
$*y = \frac{1}{2}$

b) DNE → higher exp. in numerator
ex: $\frac{2x^{②}}{x^{①} + 2}$
* no horizontal asymptote

c) $y = 0$ → higher exp. in denominator
ex: $\frac{x^{①} + 2}{2x^{②}}$
$*y = 0$