

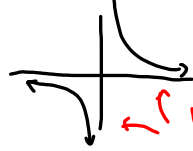
3.7 Graphs of Rational Fns. (VA, HA)

Asymptote - A value that you get closer & closer to, but never quite reach.

Rational Fns. - Quotient of 2 polynomial Fns.

Ex $f(x) = \frac{g(x)}{h(x)}$, $h(x) \neq 0$

Ex $f(x) = \frac{1}{x}$ parent fn.



branches
No x or y intercepts
branches approach asymptotes

* Vertical Asymptote

- Line $x = a$
- Any x-value you are not allowed to use.

Ex $y = \frac{x+2}{(x+1)(x-1)}$ $x \neq 1, -1$ $\therefore x=1$
 $x=-1$ VA

$y = \frac{x+1}{x^2+1}$ No VA

* Horizontal Asymptote

Line $y = b$

Case 1 - Both polynomials are the same degree.
Divide the coefficients of the highest degree terms.

Ex $f(x) = \frac{6x^2 - 3x + 4}{2x^2 - 8}$ HA: $y = \frac{6}{2}$

Ex $f(x) = \frac{x}{x-5}$ HA: $y = 1$

Case 2: Polynomial in the numerator is a lower degree than the denominator.
Then HA is $y = 0$

Ex $y = \frac{1}{x-4}$ HA: $y = 0$ Ex $y = \frac{x+2}{(x+1)(x-1)}$
 $x^2 - 1$ HA: $y = 0$

Case 3

Polynomial in the numerator is a higher degree, then there is no HA. (Slant asymptote)

Ex $y = \frac{x^2 + 4x + 4}{x+2}$ HA: None
VA: $x = -2$

(#17) $g(x) = \frac{x-2}{x^2+4x+3}$ HA: $y = 0$
 $(x+3)(x+1)$ VA: $x = -1$
 $x = -3$