

8.2 Graphing Rational Functions

Essential Question:

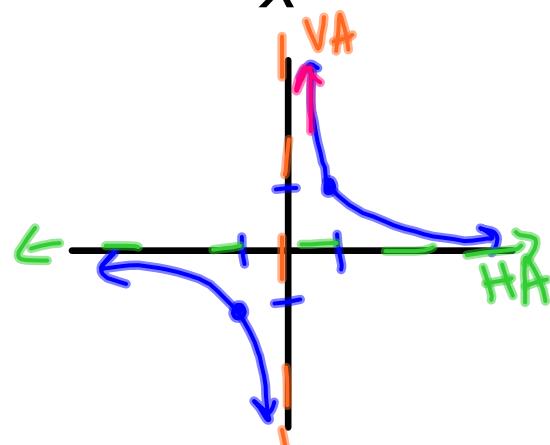
How do I find the horizontal and vertical asymptotes of a rational function?

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Essential Question: How do I find the horizontal and vertical asymptotes of a rational function?

$$f(x) = \frac{1}{x}$$

$\frac{1}{0} \therefore$



① As $x \rightarrow \infty$, $y \rightarrow 0$.
② As $x \rightarrow -\infty$, $y \rightarrow 0$

- ③ As $x \rightarrow 0^+$, $y \rightarrow \infty$
④ As $x \rightarrow 0^-$, $y \rightarrow -\infty$

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Asymptotes

- Vertical Asymptotes (VA): denominator $\underset{\text{bottom}}{= 0}$ **CAN'T CROSS**
- Horizontal Asymptotes (HA):
 - $\underset{\text{CAN CROSS}}{\frac{x^n}{x^d}}$
 - $\underset{\text{degree of top}}{\frac{\text{high}}{\text{low}}} = \text{NO}$, \checkmark for slant asymptote
 - $\underset{\text{degree of bottom}}{\frac{\text{same}}{\text{same}}} = \text{name } y = \frac{LC}{UC}$
 - $\underset{\text{high}}{\frac{\text{low}}{\text{high}}} 0 = y$

ex. Find the HA

$$\frac{8x^4 - 3x^2}{2x^4 - 2x + 1}$$

same
same

$$y = \frac{8}{2} \\ \boxed{y = 4}$$

$$\text{ex } \frac{x^3 + x^2 - x}{x^4}$$

$$y = 0$$

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Intercepts

- y-intercept: Plug in 0 for x.
- x-intercepts: Set numerator = 0 and solve
(top)

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- ex. Graph

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

* VA $x-1=0$
 $x=1$

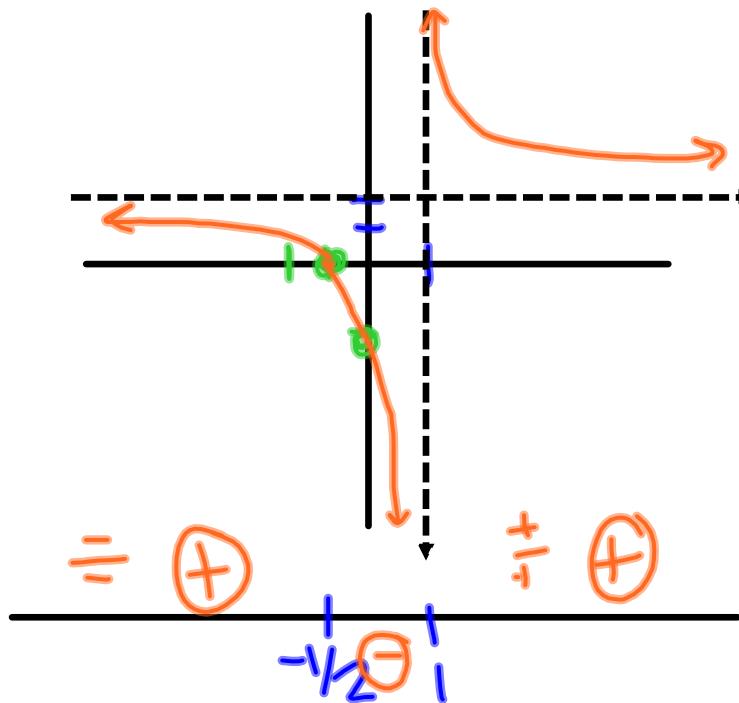
* HA same same $y=2$

* intercepts

$$x\text{-int: } 2x+1=0$$

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

$$y\text{-int: } \frac{1}{-1} = (0, -1)$$



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Essential Question: How do I find the horizontal and vertical asymptotes of a rational function?

- ex. Graph $\frac{1}{x^2 - x - 6} = \frac{1}{(x-3)(x+2)}$

* VA $x=3$ & $x=-2$

* HA $\frac{\text{low}}{\text{high}} y=0$

* x-int $1 \neq 0 \dots$

none

* y-int $\frac{1}{(-3)(2)} (0, -\frac{1}{6})$

