

Aim: What are rational functions?

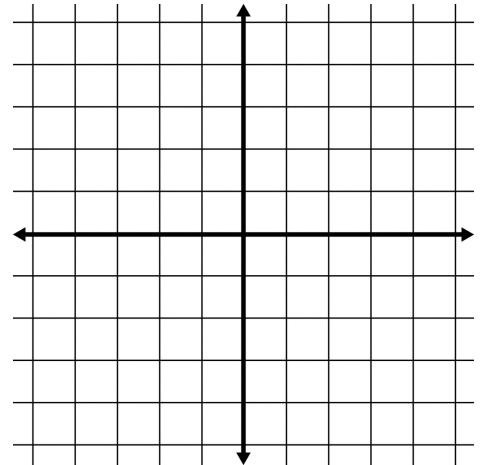
I. Do Now:

1. Write a third degree function with roots -2 and $1+i\sqrt{2}$.

2. Complete the table of values below.

Then, use the table to sketch the graph of $f(x) = \frac{1}{x}$.

x	$\frac{1}{x}$
-4	
-2	
-1	
$-\frac{1}{2}$	
$-\frac{1}{4}$	
$\frac{1}{4}$	
$\frac{1}{2}$	
1	
2	
4	



II. Def: A rational function is a function of the form $f(x) = \frac{p(x)}{q(x)}$, where $p(x)$ and $q(x)$ are polynomials with no common factors and $q(x) \neq 0$.

Consider the graph of $f(x) = \frac{1}{x}$. What is its domain? _____

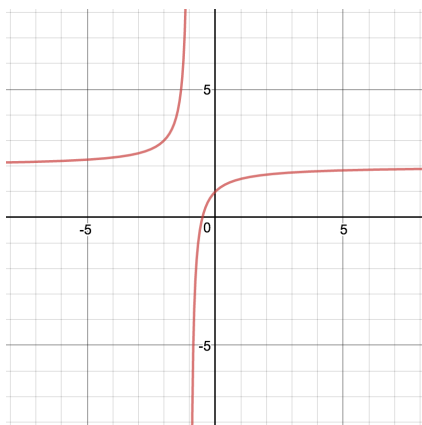
- As x approaches 0 from the left, $f(x)$ _____.
[In symbols, _____]
- As x approaches 0 from the right, $f(x)$ _____.
[In symbols, _____]
- As $x \rightarrow -\infty$, _____.
- As $x \rightarrow \infty$, _____.

III. Def: The line $x = a$ is a _____ of the graph of $f(x)$ if $f(x) \rightarrow \infty$ or $f(x) \rightarrow -\infty$ as $x \rightarrow a$ from the left or the right.

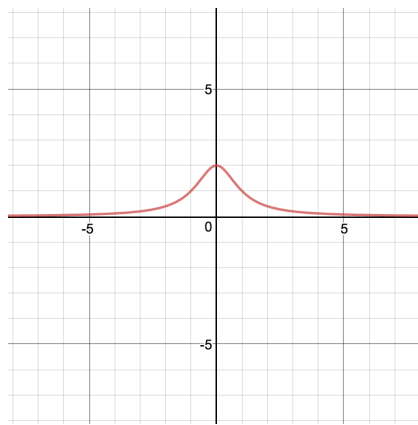
Def: The line $y = b$ is a _____ of the graph of $f(x)$ if $f(x) \rightarrow b$ as $x \rightarrow \infty$ or $x \rightarrow -\infty$.

IV. Examples. Find the equations of the asymptotes by looking at each graph.

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



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



5. $f(x) = \frac{3}{(x-2)^2}$

