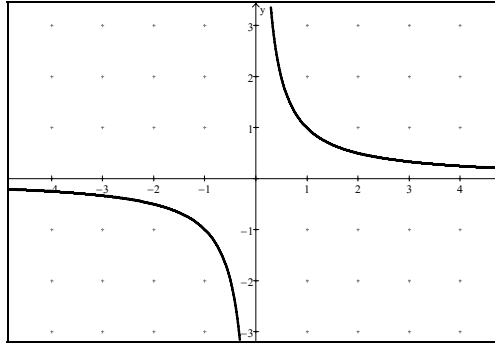


LIMITS NOTES
DAY #3
(TO INFINITY AND BEYOND!)

Look at graph of $f(x) = \frac{1}{x}$ below.



1. $\lim_{x \rightarrow \infty} \frac{1}{x} = 0$ (When x approaches infinity, y approaches zero. Look to the right!)
2. $\lim_{x \rightarrow -\infty} \frac{1}{x} = 0$ (When x approaches negative infinity, y approaches zero. Look to the left!)
3. $\lim_{x \rightarrow 0} \frac{1}{x} = \text{DNE}$ (When x approaches zero, y doesn't approach the same value.)
4. $\lim_{x \rightarrow 0^+} \frac{1}{x} = \infty$ (When x approaches zero from the right, y approaches infinity)
5. $\lim_{x \rightarrow 0^-} \frac{1}{x} = -\infty$ (When x approaches zero from the left, y approaches negative infinity)

Important theorem: $\lim_{x \rightarrow \infty} \frac{1}{x} = 0$

Limits Involving Infinity (Principle of Dominance)
1. $\lim_{x \rightarrow \infty} \frac{x^a}{x^b}$, if $a < b$. Then, limit = 0. (Look for the highest degrees/powers of x)
2. $\lim_{x \rightarrow \infty} \frac{Cx^a}{Dx^b}$, if $a = b$. Then, limit = $\frac{C}{D}$. (Look for the highest degrees/powers of x)
3. $\lim_{x \rightarrow \infty} \frac{x^a}{x^b}$, if $a > b$. Then, limit = ∞ or $-\infty$. (Look for the highest degrees/powers of x and check the sign of ∞ by substituting with a large x-value.)