

# Limits to Infinity

Summary:

lim -

$$\lim \frac{\text{power of } x}{\text{same power of } x} = \frac{\text{coefficient of largest } x}{\text{coefficient of largest } x}$$

$$\lim \frac{\text{smaller power of } x}{\text{larger power of } x}$$

$$\lim \frac{\text{larger power of } x}{\text{smaller power of } x}$$

Check every term for a higher power of x—most exams have at least one trick question to make sure that you are paying attention!

Double-check whether your limit is to  $\infty$  or to  $-\infty$ .

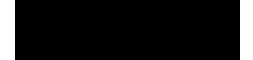
You will see this everywhere:  $\lim_{x \rightarrow \infty} \frac{1}{x} = 0$ . It is important to remember this. Similarly,  $\lim_{x \rightarrow -\infty} \frac{1}{x} = 0$  and  $\lim_{x \rightarrow \infty} \frac{1}{x^2} = 0$ .

Common Cases:

Both top and bottom have the same highest power of x:

$$\lim_{x \rightarrow \infty} \frac{+x}{+x} = \frac{+}{+} = \frac{+}{+} = \frac{+}{+} = \frac{+}{+} = \lim_{x \rightarrow -\infty} \frac{-x}{-x} = \frac{-}{-} = \frac{-}{-} = \frac{-}{-} = \frac{-}{-} = \lim_{x \rightarrow \infty} \frac{-x}{+x} = \frac{-}{+} = \frac{-}{+} = \frac{-}{+} = \frac{-}{+} = \lim_{x \rightarrow -\infty} \frac{+x}{-x} = \frac{+}{-} = \frac{+}{-} = \frac{+}{-} = \frac{+}{-} =$$

\*Be careful!  $x + x + x = x + x + x$



# Limits to Infinity

With square roots:

$$\lim_{x \rightarrow \infty} \frac{\sqrt{x+1} - \sqrt{x-1}}{x}$$

