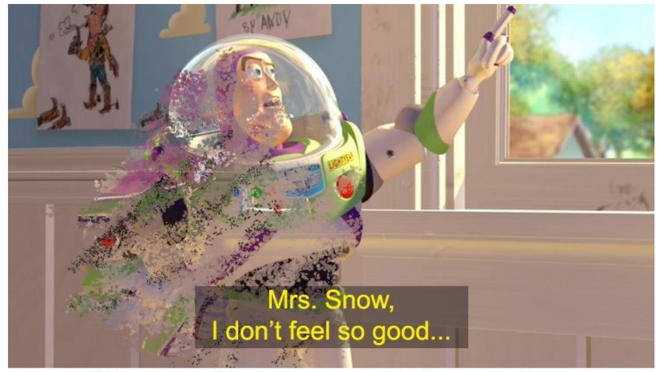
Precalculus
Lesson 14.4: Limits at Infinity
Mrs. Snow, Instructor



When you find there are limits at infinity

Just as the title of the lesson states, given a function $f(x)$ as x approaches infinity what happens to the value $f(x)$?

Find

$$\lim_{x\to\infty}\frac{1}{x} \qquad\qquad \lim_{x\to-\infty}\frac{1}{x}$$

So we get a rule to remember:

If k is any positive integer, then:

$$\lim_{x\to\infty}\frac{1}{x^k}=0 \qquad \textit{and} \qquad \lim_{x\to-\infty}\frac{1}{x^k}=0$$

Evaluate:

$$\lim_{x \to \infty} \frac{3x^2 - x - 2}{5x^2 + 4x + 1}$$

Finding a limit at negative infinity

$$\lim_{x \to -\infty} e^x$$

Can function at infinity have no limit??????

$$\lim_{x \to \infty} \sin x$$

In chapter 12 we studied sequences: $a_1, a_2, a_3, \ldots . a_n,$. Using limits we can determine the behavior of a sequence as n becomes large.

Convergent vs. divergent: Converge is when things come together from different directions so they eventually meet. Diverge is when things separate and go in different directions. Well, in sequences the term a_n may converge by approaching a number or it may not…..

Finding the Limit of a Sequence

$$\lim_{n \to \infty} \frac{n}{n+1}$$

Does the Sequence Converge or Diverge?

$$a_n = (-1)^n$$

Finding the Limit of a Sequence

Find the limit of the sequence given.

$$a_n = \frac{15}{n^3}\left[\frac{n(n+1)(2n+1)}{6}\right]$$