



About the Mathematics

The *Limits_at_infinity.tns* document provides a simple but powerful tool for investigating limits of functions numerically. The idea is to consider $\lim_{x \rightarrow \infty} f(x)$ and $\lim_{x \rightarrow -\infty} f(x)$ by substituting a sequence of numerical values for x that get larger and larger in magnitude (either positive or negative values, respectively).

Objective

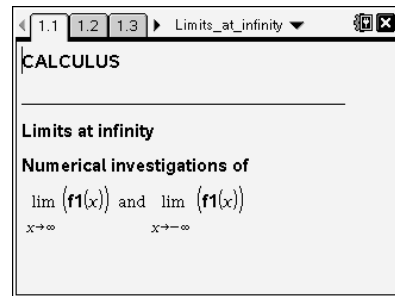
- This activity allows students to numerically investigate the limit of a function as the magnitude of the input grows without bound (i.e., as x approaches positive or negative infinity).

Using the Document

Page 1.1 provides the mathematical setting. Page 1.2 defines the function to be investigated. The example provided in the interactive math box is $f(x) = 1/x$. On page 1.3, the limit under investigation is displayed. Three sets of slider arrows have been set up. The one at the top serves as a “reset” button. The slider in the middle allows the user to step through a sequence of negative values for x (using the down arrow since the values are decreasing), and the slider at the bottom allows the user to step through a sequence of positive values for x (using the up arrow since the values are increasing). The sequences are set to start at either -1 or $+1$. The sequences begin marching in 1-unit steps, then 10-unit steps, and finally switch to “geometric” steps (factors of 10). To reset, use the slider arrow at the top of page 1.3. To consider a new function, return to page 1.2 and change the function $f(x)$.

Possible Application

Typically, you should investigate a variety of function behaviors, including ones where the two limits at infinity are finite but different ($\arctan(x)$ is a nice example). You can combine the numerical investigation with a look at the graph of f and then repeatedly zoom out horizontally. (The results of the numerical investigation can also be compared to the CAS result of evaluating the limit, if TI-Nspire CAS is used.)



TI-Nspire™ Technology Skills:

- Download a TI-Nspire document
- Open a document
- Move between pages
- Click on a minimized slider
- Define a function in an interactive math box

Tech Tips:

- Make sure the font size on your TI-Nspire handheld is set to Medium.

Lesson Materials:

Limits_at_infinity.tns

Visit www.mathnspired.com for lesson updates.