



About the Mathematics:

The *Local_Linearity.tns* document provides a tool for visualizing the idea of derivative as local slope by providing a dynamic zooming box that maintains square scaling between the x and y values.

Math Objectives:

- This activity will allow students to dynamically see the idea of "local linearity"—the behavior exhibited by a differentiable function when one zooms in on its graph.
- Students will reason abstractly and quantitatively. (CCSS Mathematical Practice)
- Students will construct viable arguments and critique the reasoning of others. (CCSS Mathematical Practice)

Using the Document:

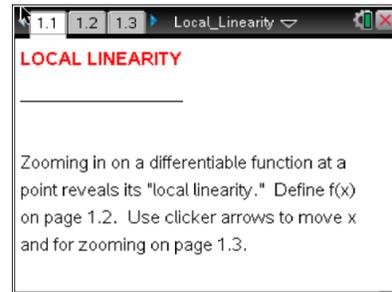
Page 1.1 provides the instructions. On page 1.2, students can define the function of interest on the Calculator page. Page 1.3 shows two windows for the graph of the function and a trace point that is moved by the slider arrows in the upper left corner of the screen. The window on the right provides for zooming in on the trace point, and the dimensions of this window are controlled by the slider arrows at the upper right.

Possible Applications:

Functions with points of non-differentiability or of discontinuity are especially important to consider (consider absolute value functions or $f(x) = x^{\frac{2}{3}}$).

Note: Zooming in as a way of developing the idea of derivative at a point is not intended as a replacement for the traditional discussion of using a sequence of secant lines to approach a tangent line.

However, many students find this approach far more intuitive, and the notion that a differentiable function's graph is locally almost linear is really the core idea behind why differentiability is such an important property for a function to have.



TI-Nspire™ Technology Skills:

- Download a TI-Nspire document
- Open a document
- Move between pages
- Define a function on a Calculator page
- Click on a minimized slider

Tech Tips:

- Make sure the font size on your TI-Nspire handheld is set to Medium.
- You can hide the function entry line by pressing  .

Lesson Materials:

Local_Linearity.tns

Visit www.mathnspired.com for lesson updates.