About the Mathematics

The Piecewise Linear Integral document provides dynamic graphs of functions that are directly manipulable, with the corresponding linked numerical values of definite integrals as well as the plot of a definite integral function shown.

Note: The complexity of this document makes it run very slowly on the handheld, so it is best used with the TI-Nspire computer software.

Math Objective

- Students will have the opportunity to use graphical interpretations of the meanings of definite integrals and definite integral functions (antiderivatives).
- Students will construct viable arguments and critique the reasoning of others. (CCSS Mathematical Practice)
- Students will reason abstractly and quantitatively. (CCSS Mathematical Practice)

Using the Document

On page 1.2, the graph of a piecewise linear function **f** is shown against an integer lattice grid of points. Five vertices of the graph are manipulable and can be grabbed and dragged vertically to other grid points in the same vertical line. The limits *a* and *x* for a definite integral of this function can also be dragged along the horizontal axis, or moved via the slider arrows provided. These limits and the value of the definite integral are updated immediately whenever *a*, *x*, or the function is changed. On page 2.2, the same setup as page 1.2 is provided, but this time the graph of the function represented by

$$\mathbf{F}(x) = \int_{\mathbf{a}}^{x} \big(\mathbf{f}(\mathbf{t})\big)\,d\mathbf{t}$$ is shown with the particular value of *x* indicated on

the graph of *y* = **F**(*x*).

Possible Applications

On page 1.2, the piecewise linear graph makes it simple to use geometry to calculate the areas of the various shaded regions associated with the definite integral. On page 2.2, the graph of the definite integral function makes a great platform for discussing the Fundamental Theorem of Calculus.
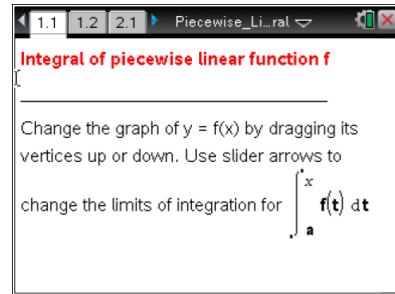
TI-Nspire™ Technology Skills:
- Open a document
- Move between pages
- Grab and drag a point
- Click on a minimized slider

Tech Tip:
- This file is best used with the TI-Nspire computer software.

Lesson Materials:
Piecewise_Linear_Integral.tns