

GeoMath Project  
Trapezoid Rule on Geometer's SketchPad

Class: AP Calculus AB

Topic Outline for Calculus AB includes Numerical Approximations to definite integrals—the use of Riemann and trapezoidal sums to approximate definite integrals of functions represented algebraically, graphically, and by tables of values. (College Board, Course Description Booklet)

Students will investigate approximating definite integrals using trapezoids. They have already done approximations with rectangles—there are good programs for the students to illustrate these on their calculators, but trapezoids were harder to see on the small calculator screen.

Students will be asked to find the value of a definite integral that does not have an easy antiderivative. They will use Geometer's SketchPad to approximate this definite integral by finding areas of trapezoids based on the graph of the function. They will use a sketch with the function already graphed called TrapSum. They will construct the trapezoids and calculate the areas bounded by the trapezoids. They will be asked to use a calculator to find a numerical value for this integral. As more and more trapezoids are added, they will find that the area very closely approximates the desired definite integral.

Attached is the worksheet to be used by the students. Prior knowledge of Geometer's SketchPad is expected. Students will be using the Construct and Measure menus extensively in this activity.

Below are some Internet sites that relate to Numerical Methods of Integration.

- Numerical Integration Utility – tool to arrive at various approximations, no graphics (<http://147.4.150.5/~matscw/RealWorld/integral/integral.html>)
- Numerical Integration – on-line lesson about various methods of approximating definite integrals, including Trapezoid Sums (<http://147.4.150.5/~matscw/RealWorld/integral/numint.html>)
- Visual Calculus: Numerical Integration – on-line tutorial including several graphics, interactive activities. (<http://archives.math.utk.edu/visual.calculus/4/approx.1/index.html>)

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