## Introduction to Numerical Integration

Many functions don't have easy to describe antiderivatives, so many integrals must be (approximately) calculated by computer or calculator. These calculations also take the form of (simpler) weighted averages. There are many different techniques for computing numerical estimates of definite integrals. We'll go over three of these techniques.
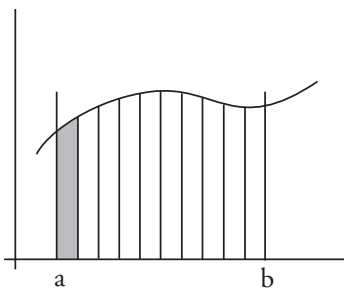
Figure 1: The area under the curve is divided into $n$ regions of equal width.

- **Riemann Sums**

  Riemann sums are a very inefficient way to estimate the area under a continuous curve.

- **Trapezoidal Rule**

  Much more reasonable than Riemann sums, but still lousy.

- **Simpson's Rule**

  Slightly trickier, clever, and pretty good.

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18.01SC Single Variable Calculus
Fall 2010