Lesson 6 - Definite Integrals

Objectives

- Define a definite integral.
- Understand integral notation.
- Understand the properties of an integral.

READ

- Stewart, Chapter 5.2, pages 366-376.

THINK ABOUT

- What is the connection between adding the area of an infinite amount of rectangles over a closed and bounded region and the definite integral over the same closed and bounded region?

MATHEMATICA COMMANDS AND TASKS YOU NEED TO KNOW

You can enter a definite integral into Mathematica in a variety of ways. First the command `Integrate[f[x],{x,a,b}]` will compute:

$$\int_a^b f(x)dx$$

You can also compute this by clicking on the definite integral symbol on the palette. To get this palette click on File, Palettes, Basic Input. Clicking that button will produce the following:

$$\int_{\square}^{\square} \square \, d\square$$

All you need to do is click in each box and type what you are trying to calculate. Be careful when your function is a polynomial. Its a good idea to put the function you are integrating into parentheses. Sometimes, the exact value of an integral cannot be calculated at all. If this happens, you can approximate the integral. Mathematica can do this for you with the command `NIntegrate[f[x],{x,a,b}]`. This will compute an approximation of the definite integral of $f(x)$ from a to b.

As an example, given the function $f(x) = \sin(\pi x^2/2)$ use all three methods discussed above and see what happens.