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Day 35 is Thursday, April 11, 2013

Section 6-5 The Fundamental Theorem of Calculus

Intro:

We have seen two uses of the integral symbol \int .

(1) The indefinite integral having to do with antiderivatives.

$$F(x) = \int f(x) dx$$

$F(x)$ is a function that is an antiderivative of $f(x)$.
(that means that $F'(x) = f(x)$.)

(2) The Definite Integral having to do with signed area.

$$A = \int_{x=a}^{x=b} f(x) dx$$

A is a number that is the signed area under the graph of f from $x=a$ to $x=b$.
(Defined as a limit of Riemann sums.)

So far it should seem strange that (1) and (2) use such similar-looking symbols. They seem to be unrelated concepts.

Here is the relationship between the two concepts.

The Fundamental Theorem of Calculus

If $F(x) = \int f(x) dx$ and $A = \int_{x=a}^{x=b} f(x) dx$
 then $A = F(b) - F(a)$

Example

Class Drill 17 Finding Signed Area using two Different Methods

