Section 5.4 Worksheet:

Assigned problems: Exercises pp. 282-284, #3, 7, 12, 22, 24, 25, 27, 43, 44 (due Thursday, 11/1)

1. Notice how we turn the so called "definite integral" into an "indefinite integral" (where one or both of the limits is a variable, rather than a fixed endpoint). Thus we create a function (the *area function*), $A(x)$, such that

$$A(x) = \int_a^x f(t)dt \tag{1}$$

What is the value of A(a), and what does it represent?

2. What does the FTC Part II assert about the relationship between A and f in (1) above?

3. Why did we switch the dummy variable of integration from our old faithful x to t in (1)?

4. Why are differentiation and integration not **perfect** inverse operations? What analogy can you draw with the functions $f(x) = x^2$ and $g(x) = \sqrt{x}$?

5. Observe the discussion of the chain rule in Example 4. The generalization is in the section summary, p. 281. Give an example of your own.

Notes:

Here we have the Fundamental Theorem of Calculus, Part II: must be pretty important stuff! The basic idea is that we can use the integral, which was derived to represent the area under a curve, as a means to creating or representing antiderivatives for functions.

There are functions – very important functions – which don't have elementary antiderivatives, so we can use the integral to understand them.