Problem Set 9

Wednesday, April 5

I. Problems to be graded on completion.

- §6.1 #2, 4, 6, 8, 10
- §5.6 #6, 8, 10, 12.
- §5.6 #2, 4. The "accumulation function" is just their name for $A(x) = \int_1^x f(t)\ dt$ in #2 and $A(x) = \int_0^x f(t)\ dt$ in #4.
- Recall that if a is some fixed number and $F(x) = \int_a^x f(t)\ dt$ then $F'(x) = f(x)$, that is,

$$\frac{d}{dx}\left(\int_a^x f(t)\ dt\right) = f(x).$$

  Do §5.6 #13, 14, 20, 22. You may want to refer to examples 3 and 4 on p. 247, but they use different notation than we do. D_x is the same as $\frac{d}{dx}$.

II. Problems to be graded on correctness.

1. Let $f(x) = \sin x$, and for each of the following partitions P of $[0, \pi]$, compute the lower sum $L(P)$ and the upper sum $U(P)$:
   a. $P = \{0, \frac{\pi}{6}, \frac{\pi}{4}, \frac{\pi}{3}, \frac{\pi}{2}, \frac{2\pi}{3}, \frac{3\pi}{4}, \frac{5\pi}{6}, \pi\}$.
   b. $P = \{0, 1, 2, 3, \pi\}$. You will need a calculator for this one.
2. Evaluate $\int_{-2}^{2} \sqrt{4 - x^2}\ dx$. Hint: be clever.
3. Let
$$F(x) = \int_{\cos(x^2)}^{\sqrt{x}} \frac{1}{\sqrt{t^4 + 1}}\ dt$$
   Find $F'(x)$.
4. Find the area between the curves $y = \sin x$ and $y = \pi x - x^2$.