**Practice and Reading**

1. (a) Reread and review Section 5.4 on average values. Read Section 5.5 on Substitution.
   (b) Average values: Page 381 #25, 27, 29, 31.
   (c) Read about definite integrals of odd and even functions (pages 377–78). Then do page 380–81 #7, 9, 15, and 43.
   (d) MVTI: Page 382 #35. First find $f_{\text{ave}}$ and the point $c$ where $f(c) = f_{\text{ave}}$.

**Hand In Next Class and WeBWorK Day 08 (due Saturday night)**

1. Do Lab 3, Problem 8(a). (Make use of Lab problem #7.)
2. Use the FTC to find $F'(x)$ if $F(x) = \int_{\pi/4}^{\pi/2} 8 \sin(\pi t^2) \, dt$. Note the limits!
3. Suppose that $\int_{1/2}^x g(t) \, dt = x^2 \ln x$. Evaluate $g(1)$ and explain your answer. Hint: Apply FTC Part 1. See Lab 3, problem 4(e).
4. (a) Breathing is cyclic. From the beginning of inhalation to the end of exhalation takes about 4 s. The **flow rate** of air into the lungs is modeled by $f(t) = \sin(\frac{\pi}{2} t)$ liters/s. Find the **average** flow rate on the interval [2, 4] seconds.
   (b) Extra credit. The flow rate $f(t)$ is the rate of change in the volume $V(t)$ of air in the lungs. Find the **net change in the volume** of air in the lungs from time $t = 2$ to $t = 4$.
   (c) What is going on physically during this period?
5. Let $f(t)$ be the function graphed below. FTC (Part 1) says that if $A(x) = \int_{-2}^{x} f(t) \, dt$, then $A'(x) = f(x)$. But also remember $A(x)$ is just the net area between $f$ and the $x$ axis on the interval from $-2$ to endpoint $x$.

(a) At what point(s), if any, does $A$ have a local max?
(b) On what interval(s) is $A$ increasing? Explain briefly.
(c) Is $A(0)$ a positive number or negative? Explain.
(d) Define $B(x) = \int_{3}^{x} f(t) \, dt$. Is $B(0)$ a positive number or negative? Explain. Think about net area and the limits of the integral.

6. Read about definite integrals of odd and even functions (p. 377–78). Then do $\int_{-101}^{101} x^9 - 5x^3 - 4x \, dx$.
7. Page 382 #40. First find $f_{\text{ave}}$ and then the point $c$ where $f(c) = f_{\text{ave}}$. Give both the exact value of $c$ and a decimal approximation.
8. Determine $\frac{d}{dx} \left[ \int_{1}^{x} \ln(t^2 + 1) \, dt + \int_{x}^{100} \ln(t^2 + 1) \, dt \right]$