Math 131 Homework: Day 8

My Office Hours: M & W 12:30–2:00, Tu 2:30–4:00, & F 1:15-2:30 or by appointment. **Math Intern** Sun: 12–6pm; M 3-10pm; Tu 2–6, 7–1pm; W and Th: 5-10 pm in Lansing 310. Website: `http://math.hws.edu/~mitchell/Math131S13/index.html`.

☕ Practice and Reading

1. a) Reread and review Section 5.4 on average values, Read Section 5.5 on Substitution. This is very important and we will discuss it on Monday.

b) ✍ Average values: Page 354 #19, 21, 23, 25.

c) Read about definite integrals of odd and even functions (pages 349–350). Then do page 354–55 #7, 9, 13, and 39.

d) MVTI: Page 355 #31. First find f_{ave} and the point c where $f(c) = f_{\text{ave}}$.

☞ Short Hand In for Monday and WeBWorK Day08 (due Monday night)

1. Do Lab 3, Problem 9(a).

2. Use the FTC to find $F'(x)$ if $F(x) = \int_{x^4}^{2} 8\sin(\pi t^2)\,dt$. 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.

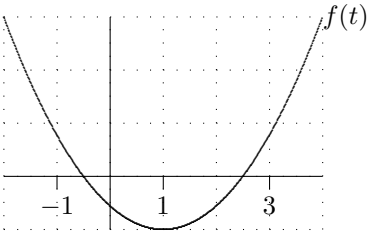
4. a) Breathing is cyclic. From the beginning of inhalation to the end of exhalation takes about 4 s. The **flow rate** of air into the lungs is modeled by $f(t) = \frac{1}{2}\sin(\frac{\pi}{2}t)$ liters/s. Find the **average** flow rate on the interval $[2, 4]$ seconds.

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 $t = 4$. What is going on physically during this period?

5. OK, the FTC 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 decreasing? 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. Page 355 #36. First find f_{ave} and then the point c where $f(c) = f_{\text{ave}}$. Give both the exact value of c and a decimal approximation.

7. Determine $\dfrac{d}{dx}\left[\displaystyle\int_{1}^{x^3} \ln(t^2+1)\,dt + \int_{x^3}^{100} \ln(t^2+1)\,dt\right]$