

March 10, 2011

18.01 Problem Set 7
Due Wednesday, March 30, in recitation

Collaboration and discussion of problem sets is a good idea; you must write up your answers on your own, and you must answer question 0 of Part II.

The point of Part I is to push you to do some of the routine practice necessary to master this material. In order for that to work, you should write your solutions without consulting the solutions provided. There's no value for anyone in faithfully transcribing the typographical errors in those printed solutions.

Part I: 10 points

Notation for homework problems: "2.4/13" means Problem 13 at the end of section 2.4 in Simmons. "1A-3" means Exercise 1A-3 in Section E (Exercises) of the Supplementary Notes (solved in section S).

- 18. 3B-2ac, 3c, 4b, 5
- 19. 3C-2c, 3b, 5b; 3E-6bc
- 20. 3E-2a, 3b; 3D-1, 4ab, 7bc; 3E-2ac
- 21. 4A-1cd, 3, 4; 4B-1bc, 3, 5

Part II: 15 points

- 0. Write the names of all the people you consulted or with whom you collaborated and the resources you used, beyond the course text and notes and your instructors; or say "none" or "no consultation."
- 1a) Using an idea from section PI of the supplementary notes, evaluate the definite integral

$$\int_0^1 \frac{dx}{x^2 + 1}.$$

- b) Calculate the upper and lower sums for the integral in (a) with four equal subintervals.
- c) Explain why π is between $2449/850$ and $2874/850$. (The average of these two numbers is $5323/1700 = 3.131\dots$, which is not terrible as an estimate of π .)
- 2a) Calculate the area under the graph of $y = \sqrt{3x+5}$ from $x = 0$ to $x = 2$. (This is exercise 3C-2a.)
- b) Calculate the area under the graph of $x = (y^2 - 5)/3$ from $y = \sqrt{5}$ to $y = \sqrt{11}$. (I've called the independent variable y instead of x , just to confuse you; the area is an integral of something times dy .)
- c) If both of us did the arithmetic right, your answers to (a) and (b) should add up to $2\sqrt{11}$. Explain how you could have predicted that before doing the calculation.
- 3a) Calculate the area under the graph of $x = e^y$ from $y = 0$ to $y = \ln(a)$.
- b) Using the idea from problem 2c and the answer to (a), calculate the area under the graph of $y = \ln(x)$ from $x = 1$ to $x = a$. (You're not supposed to know yet how to find an antiderivative of $\ln(x)$.)
- c) Using the answer to (b), write down an antiderivative of $\ln(x)$.