Put your name on the back of this page and hand it in. All work that you want graded must be either on this sheet or submitted as a spreadsheet. Do not use factorials in the spreadsheet.

Mathematics 210 — Second midterm examination, March 16, 2005

1. Use the midpoint rule for 40 intervals across $[1, 5]$ to compute

$$\int_1^5 \frac{e^{-t}}{t} \, dt \, .$$

How accurate is your estimate? (This will involve quite a bit more work.) Justify your answer as fully as you can in the Comments window on the spreadsheet.

Save this sheet as `m210.mt.1B.ms`.

2. Using no more than 4096 terms in the series, what is the most accurate estimate you can make of the sum
$$1 + \frac{1}{2^{5/4}} + \frac{1}{3^{5/4}} + \frac{1}{4^{5/4}} + \cdots ?$$

Explain your answer in the Comments window.

Save this sheet as `m210.mt.2B.ms`.

3. Suppose you toss a single fair die 200 times. What is the probability that you will get between 20 and 40 (inclusive) tosses with a 1 on top?

Save this sheet as `m210.mt.3B.ms`.

4. The function
$$f(k) = cq^k$$

for k in the range 0 to 99, is a probability distribution. Answer below: what is c? (Show how you got your answer, too.) For $q = 0.9$ and the corresponding value of c, use the spreadsheet to find its mean value and standard deviation.

Save this sheet as `m210.mt.4B.ms`.

5. Write down below the roots of
$$x^2 + 2,000,000\, x + 3 = 0$$

correct to 16 significant figures.