Written Homework 5
MATH 126

Solve each of the following problems. Work out your problems on scratch paper first, then write your solutions neatly on the pages you plan to turn in. Write the problems in assigned order, with each problem clearly labeled. Use words to clearly explain your work and methods. The reader should never have to guess or infer your intentions.

For a brief guide to writing homework solutions, see *Writing Mathematics Well* from Harvey Mudd College.

Scan or photograph your solutions and submit them (as a single file) to the Written Homework 5 assignment on Moodle. This assignment is due at classtime on **Monday, October 6**.

For each of the improper integrals below, do the following:

- Write a sentence that explains why the integral is improper. (Remember that the reason could be due to a value of x that occurs *between* the bounds of integration.)

- Determine whether the integral converges or diverges. If the integral converges, find its exact numerical value.

- Make sure you show all your work for antiderivatives and for limit calculations.

Here are the improper integrals:

1. $\displaystyle\int_0^3 \frac{3}{x\sqrt{x}}\, dx$

2. $\displaystyle\int_0^\infty \frac{x^2}{x^3 + 1}\, dx$

3. $\displaystyle\int_1^5 \frac{100}{\sqrt{x-1}}\, dx$

4. $\displaystyle\int_2^\infty \frac{1}{x\ln(x)}\, dx$

5. $\displaystyle\int_0^4 \frac{x}{(4-x^2)^2}\, dx$