136.169, Assignment No.5
March 15, 2006

The assignment is due Wednesday, March 22 , 2006 in class. Late assignments receive a mark zero.

1. Evaluate the following integrals:

   a) $\int \frac{x^2}{(1+x^2)^2} dx$. [5]

   b) $\int_0^e \sin(\ln x) dx$ [5]

   c) $\int_{\ln 2}^{\infty} \frac{1}{e^{2x} - 4e^x + 4} dx$ [5]

   d)

2. Determine the convergence of the improper integrals:

   a) $\int_0^1 \frac{dy}{4y-1}$ [3]

   b) $\int_0^{\infty} \frac{e^{-x}}{\sqrt{x}} dx$ [3]

3. Use integrals to find the area of the triangle with vertices (0, 5), (2, –2) and (5, 1). [5]

4. Let R be the region between the graphs of $y = e^{-x}$, y = 1+x and x=1.
   Set up, but **do not evaluate**, the volumes of the solids formed as:

   a) R rotates around the x axis (by method of slicing and by method of cylindrical shells.) [5]
   b) R rotates around the y axis (by method of slicing and by method of cylindrical shells.) [5]

5. Find the arc length of the part of the curve $y = x^2$, when $0 \le x \le 1$. [5]

Total [41/40]