MATH 1690, Assignment No.5
March 12, 2008

The assignment is due Wednesday, March 19, 2008 in class. Late assignments receive a mark zero.

1. Use integrals to find the area of the triangle with vertices (0, 5), (2, –2) and (5, 1). [7]

2. Evaluate the following integrals:

   a) $\int_0^{\frac{\pi}{2}} \frac{\cos x}{\sqrt{1+\sin^2 x}} dx$ [5]

   b) $\int_1^e \sin(\ln x) dx$ [5]

   c) $\int \frac{dx}{x^2(x^2-1)^{3/2}}$ (Hint: do a substitution to get an integral of a rational function.) [5]

3. If $f''(x)$ exists and is continuous on [a, b] and f(a) = f(b) = 0, show that
$$\int_a^b f(x)dx = \frac{1}{2}\int_a^b (x-a)(x-b)f''(x)dx \ .$$ [6]

   (Hint : use integration by parts twice on the right hand side.)

4. Obtain a reduction formula for $I_n = \int \tan^n x dx$ and use it to find I_3 and I_4 . [7]

5. Find the area inside both of the circles $x^2 + y^2 = 1$ and $(x-2)^2 + y^2 = 4$. [7]

Total [42/40]