

Math 13 Fall 2010: Exam 3  
Tuesday April 27, 2010

**Name:**

**Instructions:** There are 4 questions on this exam each of which is scored out of 8 points for a total of 32 points. You may not use any outside materials(eg. notes or calculators). You have 50 minutes to complete this exam. Remember to fully justify your answers.

**Score:**

**Problem 1.** Evaluate

$$\int_0^1 \int_0^{\sqrt{1-y^2}} \frac{1}{1+x^2+y^2} dx dy$$

**Problem 2.** Consider the region  $R$  that lies outside the cone  $z^2 = 3(x^2 + y^2)$  and inside the sphere  $x^2 + y^2 + z^2 = 4$  in the first octant. Set up the integral for the volume of  $R$  in rectangular, cylindrical, and spherical coordinates.

**Problem 3.** Consider the region  $R$  above the upper sheet of the hyperboloid  $x^2 + y^2 = z^2 - 1$  and below the plane  $z = 3$  with density  $\delta(x, y, z) = 2z$ .

1. Find the mass of  $R$ .
2. Set-up but do not evaluate the integral for the moment of inertia about the  $z$ -axis for  $R$ .

**Problem 4.** Let  $R$  be the parallelogram bounded by the lines  $x+y = 1$ ,  $x+y = 2$ ,  $2x-3y = 2$ ,  $2x-3y = 4$ . Evaluate

$$\iint_R 5x dA.$$