Math. 2673 Final Project Fall, 2005 Teams of at most 2. Due Wednesday 12/14/2005 10:30 a.m. of Finals week.

I. Answer the following:

Consider the following objects:
A cylinder whose radius is 1 and height is 2 and a sphere whose radius is 1.

I.) Using Maple, graph each of the objects in any coordinate systems. Hence 2 graphs.

II.) Find the volume of each object using each of the 3 coordinate systems i.e 6 problems. All work must be done in Maple to evaluate the integral. Be sure to check your work.

III. Graph the region described in each of the following and find the volume in Maple only:

1.) Find the volume inside the paraboloid \( z = (x^2 + y^2) \) and below the plane \( z = 1 \).

2.) Find the volume inside both the sphere \( x^2 + y^2 + z^2 = 2 \) and the paraboloid \( z = x^2 + y^2 \).

3.) The volume bounded by the cone whose angle in spherical coordinates is given by \( \phi = \frac{\pi}{4} \) and a sphere of radius 1.

4.) The solid in the first octant volume bounded by the cylinder \( z^2 + y^2 = 9 \) and \( z = x^2 + 3y^2 \).