

DUE: TUESDAY, APRIL 18, 2006 AT THE BEGINNING OF CLASS

1. (5 pts) Use cylindrical coordinates to find the volume of the solid that lies within both the cylinder $x^2 + y^2 = 1$ and the sphere $x^2 + y^2 + z^2 = 4$.

2. (5 pts) Evaluate the following integral by changing to cylindrical coordinates

$$\int_0^1 \int_0^{\sqrt{1-y^2}} \int_{\sqrt{x^2+y^2}}^{\sqrt{x^2+y^2}} xyz \, dz \, dx \, dy$$

3. (5 pts) Use spherical coordinates to evaluate

$$\iiint_E e^{\sqrt{x^2+y^2+z^2}} \, dV$$

where E is enclosed by the sphere $x^2 + y^2 + z^2 = 9$ in the first octant.

4. (5 pts) Evaluate the following integral by changing to spherical coordinates

$$\int_0^3 \int_0^{\sqrt{9-y^2}} \int_{\sqrt{x^2+y^2}}^{\sqrt{18-x^2-y^2}} (x^2 + y^2 + z^2) \, dz \, dx \, dy$$

5. (5 pts) **Sketch the solid region** whose volume is given by the iterated integral and **evaluate** the iterated integral

$$\int_0^{2\pi} \int_{\pi/6}^{\pi/2} \int_0^4 \rho^2 \sin \phi \, d\rho \, d\phi \, d\theta$$