1.) Consider the flat region R lying inside the circle $x^2 + (y - 2)^2 = 4$ and above the line $y = 2$. Sketch the region and describe R using

a.) vertical cross sections.

b.) horizontal cross sections.

c.) polar coordinates.

2.) Consider the solid region R inside the cylinder $x^2 + y^2 = 9$ which is bounded above by the plane $z = 4$ and below by the plane $z = 0$. Sketch the region and describe R using cylindrical coordinates.

3.) Evaluate each of the following double integrals.

a.) $\displaystyle\int_0^3 \int_0^2 xy^2 \, dx \, dy$

b.) $\displaystyle\int_0^6 \int_{(1/3)x}^2 \sin(y^2) \, dy \, dx$

4.) Consider the flat region R bounded by the graphs of $y^2 = 2x$ and $x + y = 4$. Assume the density at the point $P = (x, y)$ is given by $\delta(x, y) = x^2 + y^2$. SET UP BUT DO NOT EVALUATE the double integral which represent the *mass* of R.

6.) Set up and EVALUATE a triple integral using spherical coordinates representing the *volume* of a right circular cone of radius a and height h.

7.) Consider the solid region R enclosed by the hemisphere $z = \sqrt{9 - x^2 - y^2}$. SET UP BUT DO NOT EVALUATE triple integrals in spherical coordinates which represent the *average value* of function $f(x, y, z) = x + z$ over region R.

The following EXTRA CREDIT PROBLEM is worth . This problem is OPTIONAL.

1.) Consider the solid region R bounded below by the plane $z = 0$, on the sides by the cylinder $(x-1)^2 + y^2 = 1$, and on the top by the cone $z = \sqrt{x^2 + y^2}$. SET UP BUT DO NOT EVALUATE a triple in spherical corrdinates, which represents the volume of R.