# Problem Set #3
## Due: Wednesday, Feb. 8

1. **(a)** Change each of the following points from rectangular coordinates to cylindrical coordinates and spherical coordinates: $(2, 1, -2)$, $(\sqrt{2}, 1, 1)$, $(-2\sqrt{3}, -2, 3)$.

   **(b)** Convert the equation $r^2 \cos 2\theta = z^2$ (in cylindrical coordinates) into rectangular coordinates. (Hint: Use the formula $\cos(2\theta) = \cos^2(\theta) - \sin^2(\theta)$.)

   **(c)** Convert the equation $\rho \sin \phi = 1$ into rectangular coordinates.

2. Find a vector function that represents the curve of intersection of the cylinder $x^2 + y^2 = 4$ and the surface $z = xy$.

3. Find a vector function that represents the curve of intersection of the cone $z = \sqrt{x^2 + y^2}$ and the plane $z = y + 1$.