1) Describe the following as a set of points $\{(x, y, z)| \ldots\}$:

a) The plane through $(1, 3, -1)$ and perpendicular to the y-axis.

b) The line through $(1, 3, -1)$ parallel to the x axis.

c) The points between a sphere of radius 1 centered at the origin and a sphere of radius 2 centered at the origin, including the points a distance 1 from the origin, but not the points a distance 2.

d) The points that lie 2 units from $(0, 0, 1)$ and 2 units from $(0, 0, -1)$.

2) Find a formula for the distance from (x, y, z) to the x-axis.

3) Describe the following sets in words (section 12.6 will be quite helpful)

a) $z = x^2 + y^2$

b) $\{(x, y, z)|x^2 + y^2 - z^2 = 1\}$

c) $\{(x, y, z)|x^2 + y^2 - z^2 = 0\}$

4) The equation

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$$

describes, in two dimensions, an ellipse enclosing a region of area $\pi\, ab$. Let S be the set in $\mathbb{R}^3$ such that

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} \leq 1$$

Describe the set of points in S with $z = D$ for $-c \leq D \leq c$. What does the set, S, look like?