Math 203 (Quenell) Solution
Quiz 3 27 September 2001

1. Find the distance from the point $(3, 4, 5)$ to the z-axis.

   Solution: The distance from the point (x, y, z) to the z-axis is equal to $\sqrt{x^2 + y^2}$. In this case, the distance is $\sqrt{3^2 + 4^2} = 5$.

2. Describe in words the 1-level set of the function

$$g(x, y, z) = \frac{1}{x^2 + y^2 + \frac{z^2}{4}}.$$

   List the points at which this level set intersects the coordinate axes.

   Solution: The set where $g(x, y, z) = 1$ is the same as the set where

$$x^2 + y^2 + \frac{z^2}{4} = 1.$$

   This is an ellipsoid centered at the origin. The semiaxes in the x and y directions are 1 unit long; the semiaxis in the z direction is two units long. Thus the coordinate-axis intercepts are at $(\pm 1, 0, 0)$, $(0, \pm 1, 0)$ and $(0, 0, \pm 2)$.

3. Make a careful sketch of a contour diagram for the surface $z = x - y^2$. Include contours for $z = -2$, $z = -1$, $z = 0$, $z = 1$, and $z = 2$.

   Solution: