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: