1. For each of the following equations:

   (i) Identify the name of the surface.
   (ii) If appropriate, find the vertex or saddle point.
   (iii) If the graph has an axis, indicate the direction of that axis.
   (iv) Match it with a sketch (sketches are not necessarily oriented with respect to the usual placement of \( x, y, \) and \( z \) axes).

(It is not necessary to show work for this question. But if you get the question wrong, some work might be worth partial credit.)

(a) \( 2x^2 - 3y^2 - z + 2 = 0 \)
(b) \( 4(x + 2)^2 - 4y^2 - (z - 1)^2 = 0 \)
(c) \( 3x^2 + 3z^2 = 27 \)
(d) \( 3x^2 + y^2 + 4z^2 = 1 \)
2. Write the equation of a sphere that has a diameter with endpoints: \( P_1 = (1, 2, 3) \) and \( P_2 = (5, 0, -1) \).

![Sphere diagram]

3. On the following set of axes plot the points: \( P_1 = (1, 2, 0) \) and \( P_2 = (1, 2, 4) \). Each tick mark represents one unit.

![Axes with points graph]