

1. Find a vector that is perpendicular to the plane going through  $(0, 0, 0)$ ,  $(1, 2, -1)$  and  $(x_1, y_1, z_1)$ . Explain your reasoning and sketch the plane and the vector you found.
2. Give the equations describing a line that is perpendicular to the plane  $3x - 2y - 4z + 7 = 0$  and that goes through the midpoint of the segment connecting  $P_0 = (2, 8, 0)$  and  $Q_0 = (-4, 2, 5)$ .
3. (3, 3, 4 pts) Consider the equation  $x^2 + y^2 - 1 = z$ 
  - (a) Draw at least 3 traces of the corresponding surface, by fixing either  $x$  or  $y$ .
  - (b) Draw at least 3 contours of the corresponding surface, by fixing  $z$ .
  - (c) Sketch the surface, and/or describe it in words