Homework: Section 10.5 - 10.6

Give complete, well-written solutions to the following exercises.

1. Find parametric equations for the following lines:
   (a) the line that goes through the points (0, −3, 1) and (5, 2, 2)
   (b) the line that goes through the point (3, 2, 1) and is perpendicular to the plane described by the equation
       \[4x + 3y - 5z = 3.\]

2. Find equations for the following planes
   (a) the plane that passes through the point (1, −1, 1) and contains the line with symmetric equations
       \[x = 2y = 3z.\]
   (b) the plane that contains all points that are equidistant from the points (3, 2, −1) and (−7, 4, −3).

3. (a) Show that the planes
       \[2x + y - 3z = 4 \quad \text{and} \quad 4x + 2y - 6z = -2\]
       are parallel.
   (b) Find the distance between the two parallel planes above.

4. (Identify each surface by type (ellipsoid, paraboloid, etc.).)
   (a) \[x = y^2 - z^2\]
   (b) \[x^2 = y^2 + z^2\]
   (c) \[9y^2 + z^2 = 16\]
   (d) \[z^2 + x^2 - y^2 = 1\]

5. Find an equation for the surface consisting of all points \(P\) for which the distance from \(P\) to the \(y\)-axis is half the distance from \(P\) to the \(xz\)-plane. Identify the surface.