

## Problem sheet 11

- (1) Find the parametric equation for the line  $L$  which passes through  $(1, 2)$  and  $(2, 3)$ .
- (2) Find the parametric equation for each of the lines  $L_1, L_2, L_3, L_4$  which all pass through  $(1, 1, 1)$ , and additionally
  - $L_1$  passes through the origin.
  - $L_2$  passes through  $(0, 0, 1)$ .
  - $L_3$  passes through  $(0, 1, 1)$ .
- (3) Write the parameter form of the line  $L$  passing through the two points  $(5, 4, 3)$  and  $(5, 6, 7)$ . Find two vectors  $\vec{v}$  and  $\vec{w}$  which are perpendicular to  $L$  (and which are not parallel to each other). Give a parametric equation for the plane passing through the origin such that  $L$  is perpendicular to the plane.
- (4) Give an equation of the form  $A(x - x_0) + B(y - y_0) + C(z - z_0) = 0$  for points  $(x, y, z)$  in the plane with normal  $\vec{n} = (2, 5, 1)$  passing through  $(2, 2, 2)$ .
- (5) Two planes  $S_1$  and  $S_2$  both have the same normal vector  $\vec{n} = (4, 1, 8)$ . The point  $(2, 2, 2)$  is in  $S_1$  and the point  $(1, -2, 3)$  is in  $S_2$ . Are  $S_1$  and  $S_2$  the same plane?
- (6) Find an equation for the plane that is parallel to the plane  $3x + 2y - z = 1$  and passes through the point  $(1, 1, 1)$ .
- (7) Let  $L_1$  be the line in  $\mathbb{R}^2$  given by  $7y + x = 4$  and  $L_2$  be the line  $8y + x = 7$ . What is the angle between  $L_1$  and  $L_2$ ?