Line Equations

1. Find the coordinates of three points on each of the following lines.

   a. $\frac{x+2}{3} = \frac{y-1}{2} = \frac{z+5}{-3}$

   b. $x = -1 + 5t$
      $y = 7 + t$
      $z = 3 - 2t$

2. Write vector and parametric equations of the line determined by each of the following conditions
   a. Passes through A(1, -2, 3) and B(-1, 5, 0).
   b. Passes through A(3, -1, 2) and parallel to the x-axis.

3. Write the parametric and vector equations of $\frac{x+2}{3} = \frac{y-1}{2} = \frac{z+5}{-3}$ and plot a graph of this line when t = -2, -1, 0, 1 and 2.

4. Write parametric and symmetric equations for the z-axis.

5. Recall that there are three coordinates planes in 3-space. A line in R^3 is parallel to xy-plane, but not to any of the axes. Explain what this tells you about parametric and symmetric equations in R^3. Support your answer using examples.

6. A line has direction angles 60°, 45°, 60° and passes through the point (1, -2, 5). Determine vector, parametric and symmetric equations of this line.

7. Find the vector, parametric and symmetric equations of a line that intersect both line 1 and line 2 at 90°.

   L_1 : $x = 4 + 2t$
   $y = 8 + 3t$
   $z = -1 - 4t$

   L_2 : $x = 7 - 6t$
   $y = 2 + t$
   $z = -1 + 2t$

Coplanar Vectors

1. Prove that vectors $\vec{u}$, $\vec{v}$and $\vec{w}$are coplanar if and only if vectors $\vec{u}$, $\vec{v}$and $\vec{w}$are linearly dependent.
2. Determine if, $\vec{w}_1 = 2\vec{v}_1 + 3\vec{v}_2$, $\vec{w}_2 = \vec{v}_2 + 2\,\vec{v}_3$ and $\vec{w}_3 = -\,\vec{v}_1 - 3\vec{v}_3$ are coplanar.
3. Explain how you would prove if four given points are coplanar. Use your method to determine if A(3, 1, 0), B(2, -3, 1), C(-1, 0, 4) and D(5, -6, -2) are coplanar.