



**United International University**  
***School of Science and Engineering***

Assignment- 01 Trimester: Fall 2024

Course Title: Coordinate Geometry and Vector Analysis

Course Code: Math 2201

1.  $\mathbf{v} = (2, 7)$ ,  $\mathbf{e}_1 = (\frac{1}{2}, \frac{\sqrt{3}}{4})$  and  $\mathbf{e}_2 = (\frac{2}{3}, \frac{\sqrt{5}}{3})$ . Find the scalar components of  $\mathbf{v}$  along  $\mathbf{e}_1$  and  $\mathbf{e}_2$  and the vector components of  $\mathbf{v}$  along  $\mathbf{e}_1$  and  $\mathbf{e}_2$ .
2. Let  $L_1$  and  $L_2$  be the lines.  
$$L_1: x = 1 + 2t, y = 3 + t, z = 1 + t$$
$$L_2: x - 2 = 8t, y - 2 = 5t, z - 4 = 2t$$
  - a. Are the lines parallel?
  - b. Do the lines intersect?
  - c. Find the distance between the lines if possible.
3. Determine the line  $x = 2 - t, y = 3 + t, z = t$  is parallel to the plane  $2x + y + z = 1$ .
4. Find the projection of  $\underline{\mathbf{v}}$  on  $\underline{\mathbf{b}}$  and the vector component of  $\mathbf{v}$  orthogonal to  $\mathbf{b}$  where  $\underline{\mathbf{v}} = -3\hat{i} - 2\hat{j}$ ,  $\underline{\mathbf{b}} = 2\hat{i} + \hat{j}$ .
5. Find an equation of plane passing through the point  $P(-1, 4, 8)$ ,  $Q(2, 7, 0)$  and  $R(2, 3, 5)$ .
6. Find, to the nearest degree, the angles that a diagonal of a box with dimensions 10 cm by 15 cm by 25 cm makes with the edges of the box.
7. Find the volume of the parallelepiped that is determined by the vectors  $(4, -8, 1)$ ,  $(2, 1, -2)$  and  $(3, -4, 12)$  as adjacent edges.

