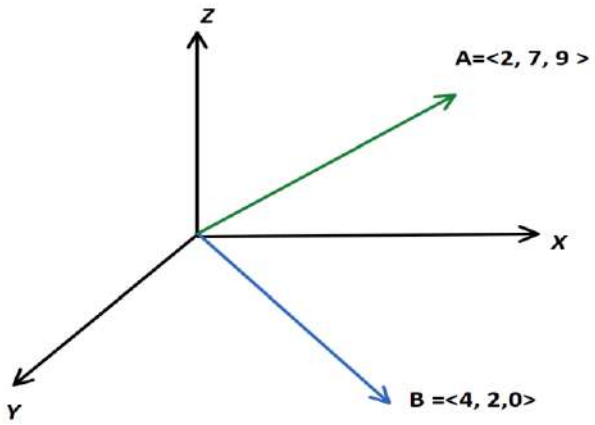
United International **University**
School of Science and Engineering
Mid Term Exam Trimester: Fall 2023
Course Title: Coordinate Geometry and Vector Analysis
Course Code: Math 2201 Marks: 30
Total Time: 1 hour and 45 minutes

Answer all questions.

1.	**a)** Rotate the coordinate axes to remove the xy-term, then identify the type of conic $x^2 + 2\sqrt{3}\,xy + 3y^2 + 2\sqrt{3}\,x - 2y = 0$.	**[5]**
	b) Sketch the graph of conic $5x^2 + 9y^2 + 20x - 54y + 56 = 0$.	**[5]**
2.	**a)** Determine the distance between the given skew lines L_1: $x = 3 - t,\quad y = 4 + 4t,\quad z = 1 + 2t$ L_2: $x = t,\quad y = 3,\quad z = 2t$	**[4]**
	b) Find the equation of the plane passing through the points $p_1(1, -2, 0)$, $p_2(1, 0, -2)$ and $p_3(-1, 5, 0)$.	**[3]**
	c) Find an equation of a line that is intersection of the planes $x - y + 2z = 0$ and $2x + 3y - z + 1 = 0$.	**[3]**
3.	**a)** Find the area of the triangle with vertices $P_1(1, -1, 0)$ $P_2(-1, 0, 3)$ and $P_3(0, 4, 1)$.	**[3]**
	b) Find the vector component (orthogonal projection) of $q =< 1, -1,\ 5 >$ along $p =< 4, 0, -1 >$ and orthogonal to p.	**[3]**
	c)  **i)** Find the angle between vector **A** and **y**-axis. **ii)** Find a unit vector that is orthogonal to vector **A** and x-axis.	**[4]**