United International University
School of Science and Engineering
Mid Term Exam Trimester: Spring 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) Identify the type of Conic. [4]

$$4x^2 - 2\sqrt{3}xy + 2y^2 - 2x + 2y + 3 = 0$$

b) Sketch the graph of the Conic.

$$x^2 - y^2 - 4x - 6y - 30 = 0\,.$$ [4]

c) Find an equation for the conic that has its vertex at $(4, 3)$ and its focus at $(4, -1)$. [2]

2. a) Determine whether or not the given lines are skew [3]

$$L_1: \quad x = 1 + 7t, \quad y = 3 + t, \quad z = 5 - 3t$$

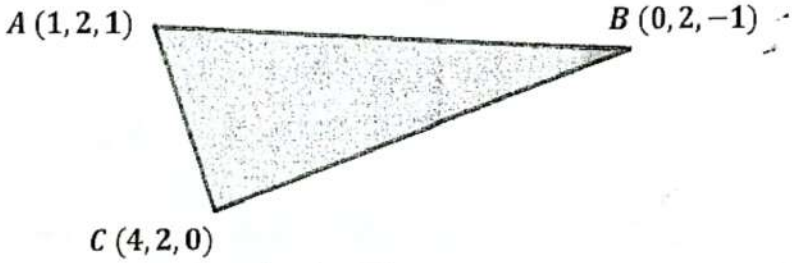
$$L_2: \quad x = 4 - t, \quad y = 2 + 6t, \quad z = 7 + 2t$$

b) Find the equation of line of intersection of the planes [3]

$2x + 4y + 6z = 4$ and $x - 2y + 4z = 2$.

c) Find the distance between planes $x + y + z = 3$ and $3x + 3y + 3z = 1$ [2]

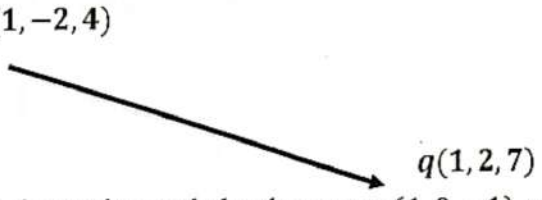
3. [4]



a) Find the area of the triangle ABC

b) Find the equation of the plane passing through the points A, B and C.

4. a) Find a unit vector in the direction of $\overrightarrow{pq}$. [2]



b) Determine the angles made by the vector $(1, 0, -1)$ with the x and z axis. [2]

c) Find the vector component (orthogonal projection) of $p =< 1, 2, 0 >$ along $q =< 0, -1, 2 >$ and orthogonal to q. [4]