United International University
School of Science and Engineering
Mid Term Examination Trimester: Summer-2022
Course Title: Coordinate Geometry and Vector Analysis
Course Code: Math 2201 / Math 201 Marks: 30 Time: 1 Hour & 45 Mins

Answer all questions. Answer all parts of a question together.

1. (a) **Identify & sketch** the curve $x^2 + 2\sqrt{3}xy + 3y^2 + 2\sqrt{3}x - 2y = 0$. [6]

   (b) **Find** an equation for the hyperbola that has foci $(-2,-3)$ and $(-2,5)$ and distance between vertices 6. [4]

2. (a) Suppose that two forces F_1 and F_2 are applied at the same point on an object. If the magnitude of F_1 and F_2 are 263 *lb* and 327 *lb* respectively and F_2 makes an angle $60°$ with the positive x-axis and F_1 makes an angle $45°$ with F_2, then **find** the magnitude of the **resultant force** of them and the **angle** that it makes with the positive x-axis. [4]

   (b) A force of $F = -2i + 5j + 3k$ *newtons* is applied to a point that moves a distance of 27 *meters* in the direction of the vector $i - 2j - 5k$. How much work is done? [2]

   (c) **Find** the angle and distance between the planes $2x - 3y + 5z + 3 = 0$ and $-4x + 6y - 10z = 5$. [4]

3. (a) **Find** an equation of plane that passes through the points $(3,-2,-1)$, $(-1,-2,3)$ and is perpendicular to the plane $2x - 5y + 3z = 9$. [4]

   (b) **Determine** whether the following lines are *skew* or *not*. [3]

$$L_1: x = 3 + 8t, \quad y = 5 - 3t, \quad z = 6 + t$$
$$L_2: x = 2 + 8t, \quad y = 6 - 8t, \quad z = 10t$$

   (c) **Find** the volume of the parallelepiped that has $\langle 1,-3,-2\rangle, \langle -2,3,-4\rangle$ and $\langle -3,\ 1,4\rangle$ as adjacent edges. [3]