Midterm Examination I

Print your name: _____   _____

Print your ID #: _____

You have 50 minutes to solve the problems. Good luck!

1. Give a one point/two vectors representation of the plane described by the equation:

   A. $x - 2y + 3z - 4 = 0$.

   B. $x + 2y - 3z + 4 = 0$.

2. Compute the distance between the point P and the line l where:

   A. $P = \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$ and $l = \left\{ t \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix} \mid t \in \mathbb{R} \right\}$.

   B. $P = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$ and $l = \left\{ t \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix} \mid t \in \mathbb{R} \right\}$.

3. What is the area of the triangle with vertices P, Q and R:

   A. $P = \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$, $Q = \begin{bmatrix} 1 \\ -1 \\ 1 \end{bmatrix}$ and $R = \begin{bmatrix} 1 \\ 1 \\ -1 \end{bmatrix}$.

   B. $P = \begin{bmatrix} 1 \\ 2 \\ 1 \end{bmatrix}$, $Q = \begin{bmatrix} 1 \\ -2 \\ 1 \end{bmatrix}$ and $R = \begin{bmatrix} 1 \\ 2 \\ -1 \end{bmatrix}$.

4. Where does the line l intersect the plane through the origin and spanned by the vectors u and v:

   A. $l = \left\{ \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix} + t \begin{bmatrix} -1 \\ 0 \\ 1 \end{bmatrix} \mid t \in \mathbb{R} \right\}, u = \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$ and $v = \begin{bmatrix} 1 \\ -1 \\ 1 \end{bmatrix}$.

   B. $l = \left\{ \begin{bmatrix} 3 \\ 2 \\ 1 \end{bmatrix} + t \begin{bmatrix} 1 \\ 2 \\ -1 \end{bmatrix} \mid t \in \mathbb{R} \right\}, u = \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$ and $v = \begin{bmatrix} 1 \\ -1 \\ 1 \end{bmatrix}$.

5. What is the unit tangent vector to the ellipse

   A. $5x^2 + 2y^2 = 1$ **B.** $2x^2 + 5y^2 = 1$

   at the point P

   A. $P = (\frac{1}{2\sqrt{5}}, \frac{\sqrt{3}}{2\sqrt{2}})$ **B.** $P = (-\frac{\sqrt{3}}{2\sqrt{2}}, \frac{1}{2\sqrt{5}})$.