Assignment 1:

Vectors Determinants & Matrices.

1. Find the position vector of $A(2,4,-5)$

2. Find the unit vector along $\bar{a} = 3\hat{i} - 9\hat{j} + \sqrt{10}\hat{k}$

3. Show the points A, B, C are collinear.
$A \equiv (2,-1,4)$ $B \equiv (3,2,5)$ $C \equiv (5,8,7)$.

4. Find Scalar Product $\bar{a} = 2\hat{i} - 3\hat{j} + \hat{k}$
$\bar{b} = \hat{i} + 2\hat{j} - 3\hat{k}$

3. Show the vectors are mutually perpendicular
$\bar{a} = -2\hat{i} - 3\hat{j} + \hat{k}$, $\bar{b} = \hat{i} + \hat{j} + 5\hat{k}$, $\bar{c} = -16\hat{i} + 11\hat{j} + \hat{k}$

4. Find cosine of the angle between the vectors $\bar{a}$ and $\bar{b}$, if
$\bar{a} = \hat{i} - 2\hat{j} + \hat{k}$ $\bar{b} = 2\hat{i} - 2\hat{j} + 2\hat{k}$

5. Find the projection of $\bar{b}$ on $\bar{a}$
$\bar{a} = 2\hat{i} + 3\hat{j} - 4\hat{k}$ and $\bar{b} = \hat{i} - \hat{j} - \hat{k}$.

6. Find $\bar{a} \times \bar{b}$
$\bar{a} = 3\hat{i} - \hat{j} + 2\hat{k}$ $\bar{b} = \hat{i} + 5\hat{j} - 2\hat{k}$

7. Find the sine of the angle between the vectors $\bar{a}$ and $\bar{b}$ if
$\bar{a} = \hat{i} - 2\hat{k}$ $\bar{b} = \hat{j} - 4\hat{k}$.

8. Find vector area of the triangle, the position vectors of whose vertices are
$2\hat{i} + \hat{j} - 3\hat{k}$, $\hat{i} + 2\hat{j} + \hat{k}$, $3\hat{i} + \hat{j} - 2\hat{k}$.

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9. Find Value of Determinants where $i = \sqrt{-1}$

$$\begin{vmatrix} 1+3i & i-2 \\ -i-2 & 1-3i \end{vmatrix}$$

10. Check if singular or non-singular matrix.

$$\begin{bmatrix} 3 & 5 & 7 \\ -2 & 1 & 4 \\ 8 & 2 & 5 \end{bmatrix} \qquad \begin{bmatrix} 7 & 5 \\ -4 & 7 \end{bmatrix}$$

11. If $A = \begin{bmatrix} 2 & 1 & 4 \\ 3 & 0 & 2 \\ 1 & 2 & 1 \end{bmatrix}$ $B = \begin{bmatrix} -1 & 1 & 1 \\ 2 & 3 & 0 \\ 1 & -3 & 1 \end{bmatrix}$

Find AB

12. Find A^T if $A = \begin{bmatrix} 2 & 4 & -1 \\ 3 & -1 & 2 \end{bmatrix}$

Submit by Saturday 16/03/2024

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