Assignment 07

1. A vector is given as 
\[ \mathbf{v} = \begin{pmatrix} 2 \\ 3 \\ 1 \end{pmatrix} \]

(a) Find the magnitude of \( \mathbf{v} \).

(b) Find the normal vector of \( \mathbf{v} \).

(c) Find the angle between \( \mathbf{v} \) and the origin.

2. Given \( \mathbf{a} = \begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix} \), \( \mathbf{b} = \begin{pmatrix} 4 \\ 5 \\ 6 \end{pmatrix} \), and \( \mathbf{c} = \begin{pmatrix} 7 \\ 8 \\ 9 \end{pmatrix} \), find the scalar triple product \( \mathbf{a} \cdot (\mathbf{b} \times \mathbf{c}) \).

3. A vector \( \mathbf{d} \) is given as 
\[ \mathbf{d} = \begin{pmatrix} d_x \\ d_y \\ d_z \end{pmatrix} \]

(a) If \( \mathbf{d} \) is a unit vector, express \( \mathbf{d} \) in terms of its components.

(b) Calculate the dot product of \( \mathbf{d} \) and \( \mathbf{e} = \begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix} \).

(c) Find the projection of \( \mathbf{d} \) onto \( \mathbf{e} \).

---

Unit 10 - Week 7 - Support Vector Machine (SVM)

[Diagram of SVM model with support vectors and margins]