

Compsci.373 Tutorial 4

REVISION

1. Vector Projection

- a) Given vector \mathbf{C} which is the projection of vector \mathbf{A} ONTO vector \mathbf{B} . Express the magnitude of vector \mathbf{C} in terms of vector \mathbf{A} and vector \mathbf{B} .
- b) Given vector $\mathbf{A} = \begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix}$ and vector $\mathbf{B} = \begin{pmatrix} 1 \\ 3 \\ 4 \end{pmatrix}$. Find the magnitude of the vector \mathbf{C} , where vector \mathbf{C} is vector \mathbf{A} projected ONTO \mathbf{B} .
- c) Given vector $\mathbf{E} = \begin{pmatrix} 0 \\ 1 \\ 3 \end{pmatrix}$ and vector $\mathbf{F} = \begin{pmatrix} 3 \\ 2 \\ 4 \end{pmatrix}$. Find the vector \mathbf{G} , where vector \mathbf{G} is vector \mathbf{E} projected ONTO \mathbf{F} .

2. Area and Volume

- a) Find the area of the parallelogram defined by vector $\mathbf{a} = \begin{pmatrix} 1 \\ 8 \\ 1 \end{pmatrix}$ and vector $\mathbf{b} = \begin{pmatrix} 1 \\ 2 \\ 1 \end{pmatrix}$.
- b) Find the area of the triangle defined by vector $\mathbf{c} = \begin{pmatrix} 2 \\ 1 \\ 3 \end{pmatrix}$ and vector $\mathbf{d} = \begin{pmatrix} 1 \\ 2 \\ 4 \end{pmatrix}$.
- c) Find the volume of the parallelepiped defined by vector $\mathbf{e} = \begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix}$, vector $\mathbf{f} = \begin{pmatrix} 5 \\ 1 \\ 1 \end{pmatrix}$ and vector $\mathbf{g} = \begin{pmatrix} 2 \\ 2 \\ 1 \end{pmatrix}$.

3. Affine Transform

- a) Given the following affine transformation $T = \begin{pmatrix} 0 & -1 & -2 \\ 1 & 0 & -2 \\ 0 & 0 & 1 \end{pmatrix}$. Given that T represents a translation FOLLOWED by a rotation. Given that the rotation is 90 degrees, what is the translation?

4. Find the plane

- a) Find the plane defined by the intersection between plane $x + y + z = 2$ and the plane $x - 2y + z = 0$ and the origin?