

EE5609: Matrix Theory

Assignment-1

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Abstract—This document contains the solution to find a unit vector that makes an angle of $90^\circ, 135^\circ, 45^\circ$ with positive X, Y and Z axis respectively.

Soln : Given,

$$\mathbf{m} = \begin{pmatrix} \cos 90^\circ \\ \cos 135^\circ \\ \cos 45^\circ \end{pmatrix} \quad (0.0.1)$$

we know that,

$$\mathbf{m} = \frac{\mathbf{m}}{\|\mathbf{m}\|} \quad (0.0.2)$$

Also,

$$\|\mathbf{m}\| = \sqrt{0^2 + \left(\frac{-1}{\sqrt{2}}\right)^2 + \left(\frac{1}{\sqrt{2}}\right)^2} \Rightarrow \|\mathbf{m}\| = 1 \quad (0.0.3)$$

Hence, From (0.0.1) and (0.0.3) we have the unit vector:

$$\mathbf{m} = \begin{pmatrix} 0 \\ \frac{-1}{\sqrt{2}} \\ \frac{1}{\sqrt{2}} \end{pmatrix} \quad (0.0.4)$$