Assignment - 12.11.1.1

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CONTENTS

I. PROBLEM

If a line makes angles $90°, 135°, 45°$ with x,y and z-axis respectivly. Find its direction cosines.

II. SOLUTION

let

$$\mathbf{A} = \begin{pmatrix} 90° \\ 135° \\ 45° \end{pmatrix} = \begin{pmatrix} 0 \\ -\frac{1}{\sqrt{2}} \\ \frac{1}{\sqrt{2}} \end{pmatrix} \tag{1}$$

The Directional vector of x,y and z-axis are respectivly as

$$\mathbf{e}_1 = \begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix}, \mathbf{e}_2 = \begin{pmatrix} 0 \\ 1 \\ 0 \end{pmatrix}, \mathbf{e}_3 = \begin{pmatrix} 0 \\ 0 \\ 1 \end{pmatrix}, \tag{2}$$

$$\|\mathbf{A}\| = \sqrt{\begin{pmatrix} 0 & -\frac{1}{\sqrt{2}} & \frac{1}{\sqrt{2}} \end{pmatrix} \begin{pmatrix} 0 \\ -\frac{1}{\sqrt{2}} \\ \frac{1}{\sqrt{2}} \end{pmatrix}} \tag{3}$$

$$= 1 \tag{4}$$

The Direction cosines of vector $\mathbf{A}$ are

$$\cos\theta_1 = \begin{pmatrix} 0 & -\frac{1}{\sqrt{2}} & \frac{1}{\sqrt{2}} \end{pmatrix} \begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix} \tag{5}$$

$$= 0 \tag{6}$$

$$\cos\theta_2 = \begin{pmatrix} 0 & -\frac{1}{\sqrt{2}} & \frac{1}{\sqrt{2}} \end{pmatrix} \begin{pmatrix} 0 \\ 1 \\ 0 \end{pmatrix} \tag{7}$$

$$= -\frac{1}{\sqrt{2}} \tag{8}$$

$$\cos\theta_3 = \begin{pmatrix} 0 & -\frac{1}{\sqrt{2}} & \frac{1}{\sqrt{2}} \end{pmatrix} \begin{pmatrix} 0 \\ 0 \\ 1 \end{pmatrix} \tag{9}$$

$$= \frac{1}{\sqrt{2}} \tag{10}$$

https://github.com/sssurajit/fwc/blob/main/vectors/12.11.1.1/codes/code.py

Execute the code by using the command
python3 code.py