

# Equation of Unit Vector

## 1 12<sup>th</sup> Maths - Chapter 10

This is Problem-5 from Exercise 5.5

1. Find the value of  $x$  for which  $x(\hat{i} + \hat{j} + \hat{k})$  is a unit vector

## 2 Solution

Given points are

$$\mathbf{x} = \begin{pmatrix} 1 \\ 1 \\ 1 \end{pmatrix} \quad (1)$$

unit vector formula is

$$\vec{x} = \frac{1}{\|\mathbf{x}\|} \mathbf{x} \quad (2)$$

where

$$\|\mathbf{x}\| = \sqrt{(1 \ 1 \ 1) \begin{pmatrix} 1 \\ 1 \\ 1 \end{pmatrix}} \quad (3)$$

$$= \sqrt{3} \quad (4)$$

Hence ,the unit vector is

$$\vec{x} = \frac{1}{\sqrt{3}} \begin{pmatrix} 1 \\ 1 \\ 1 \end{pmatrix} \tag{5}$$

$$= \begin{pmatrix} \frac{1}{\sqrt{3}} \\ \frac{1}{\sqrt{3}} \\ \frac{1}{\sqrt{3}} \end{pmatrix} \tag{6}$$