MATGEO - 1.10.28

AI24BTECH11034 - Tanush Sri Sai Petla

Question

Write down a unit vector in XY-plane, making an angle of 30° with the positive direction of X-axis.

Terms Used

Table: Terms used

Term	Description
α	Angle made by the vector with positive X-axis
β	Angle made by the vector with positive Y-axis
m	unit direction vector

Solution

In the 2D space, the unit direction vector is defined as

$$m = \begin{pmatrix} \cos\alpha \\ \cos\beta \end{pmatrix} \tag{1}$$

Where $\alpha.\beta$ are the angles made by the vectors with the axes.
Angle made by the unit vector in question with the positive X-axis and positive Y-axis :

$$\alpha = 30^\circ \tag{2}$$

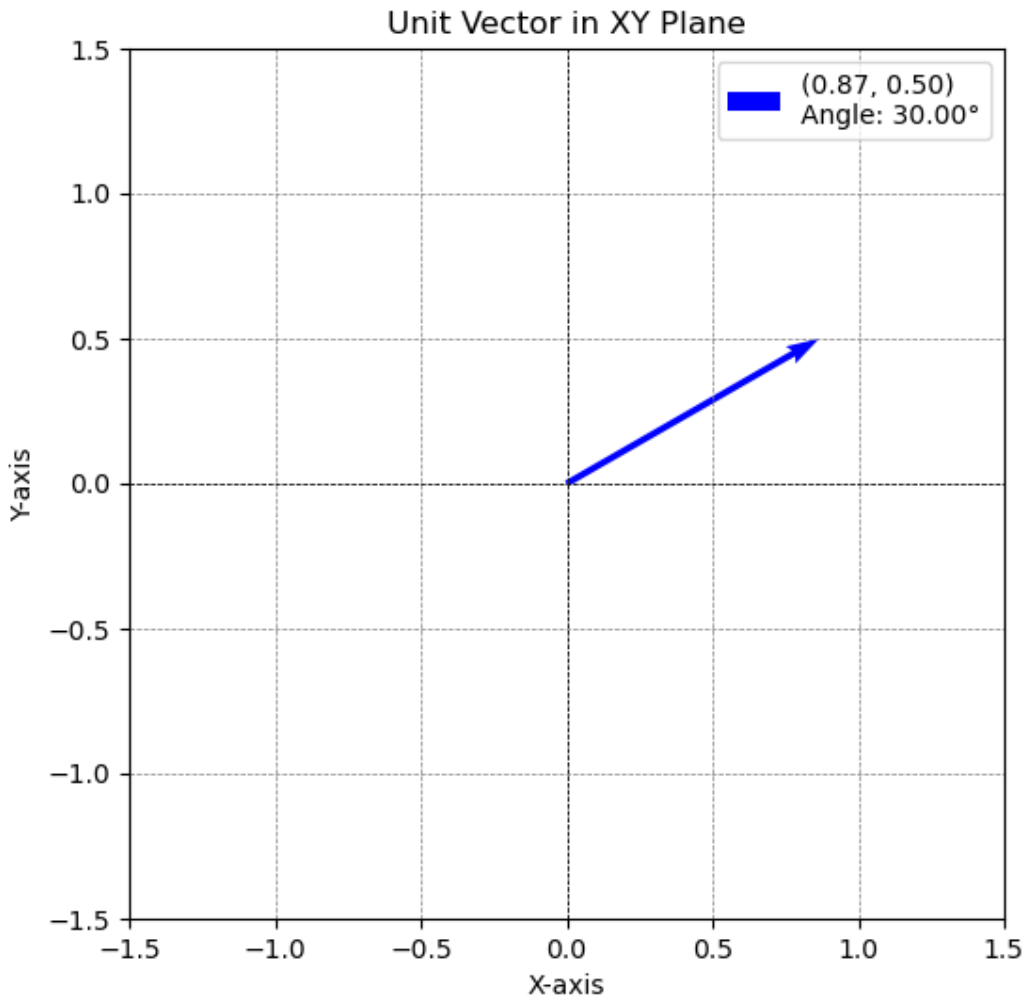
$$\beta = 60^\circ \tag{3}$$

Solution

From equation 1, the required unit vector is:

$$\begin{pmatrix} \frac{\sqrt{3}}{2} \\ \frac{1}{2} \end{pmatrix}$$

Plot


Unit Vector in XY Plane
(0.87, 0.50)
Angle: 30.00°
Y-axis
X-axis
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−1.5
−1.0
−0.5
0.0
0.5
1.0
1.5

Python code for graph

Python code for graph