9.5.3

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

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

TABLE 1: Terms used

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

$$m = \begin{pmatrix} \cos\alpha \\ \cos\beta \end{pmatrix} \tag{0.1}$$

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 :

$$\alpha = 30^\circ \tag{0.2}$$

$$\beta = 60^\circ \tag{0.3}$$

From equation 0.1, the required unit vector is:

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

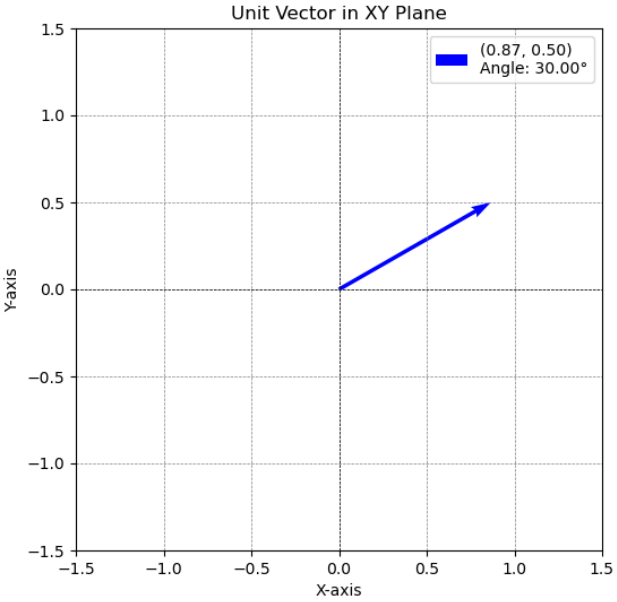

Fig. 0.1: Plot showing the line AB