

MATH-COMPUTING

December 18, 2023

1. **Question(MATH-12.10.5.17):** Let \vec{a} and \vec{b} be two unit vectors and θ is the angle between them. Then $\vec{a}+\vec{b}$ is a unit vector.

solution: As given two vectors a and b are two unit vectors and θ is the angle between them, then, $|a| = |b| = 1$

Now, $(a+b)$ is a unit vector if $|a+b|=1$

$$(a+b)^2 = (a+b) \cdot (a+b) = 1$$

$$a^2 + ab + ba + b^2 = 1$$

$$1^2 + 1^2 + 2ab = 1$$

$$ab = \frac{-1}{2}$$

$$|a||b|\cos\theta = \frac{-1}{2}$$

$$\cos\theta = \frac{-1}{2}$$

$$\theta = \cos^{-1}\frac{-1}{2}$$

$$\theta = \frac{2\pi}{3}$$