

0.1 Unit 02

0.1.1 September 02, 2021 - Vectors

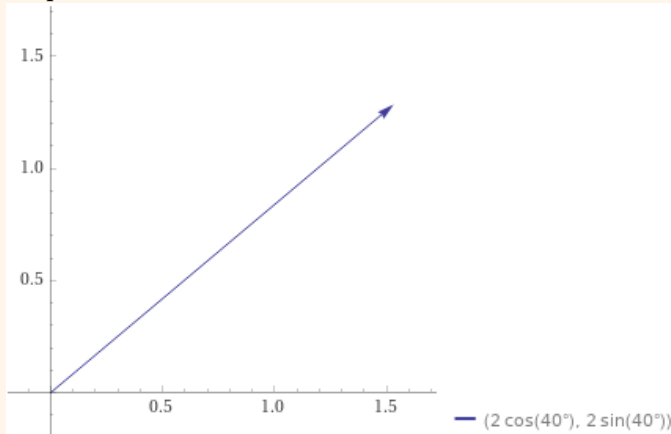
1 Remark

Let's suppose we have a vector A of length 2 meters and 40° N of E

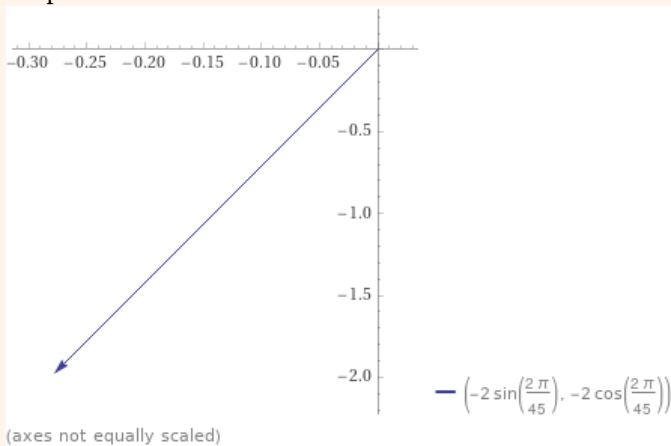
We also have a vector B of length $2m$ and 8° W of S

We wish to compute $A + B$

Graph A:



Graph B:



Let's convert vectors to x and y coordinates, then

$$A = \begin{bmatrix} 1.53209 \\ 1.28558 \end{bmatrix}, B = \begin{bmatrix} -0.273846 \\ -1.98054 \end{bmatrix}$$

Then,

$$A + B = \begin{bmatrix} 1.53209 + (-0.273846) \\ 1.28558 + (-1.98054) \end{bmatrix} = \begin{bmatrix} 1.25374 \\ -0.694956 \end{bmatrix} = 1.25374\hat{i} - 0.694956\hat{j}$$

To find the length, we can use the Pythagorean theorem:

$$1.25374^2 + (-0.694956)^2 = 1.43347$$

2 **Definition** (Unit Vectors)

- \hat{i} is the unit vector in the x direction
- \hat{j} is the unit vector in the y direction
- \hat{k} is the unit vector in the z direction

3 **Remark**

The syntax for a vector in the TI-89 graphing calculator is $[r, \angle \theta]$.

- You can also switch between polar (cylindrical) and rectangular.

4 **Remark**

You can take the derivative of a vector with respect to each of its components.