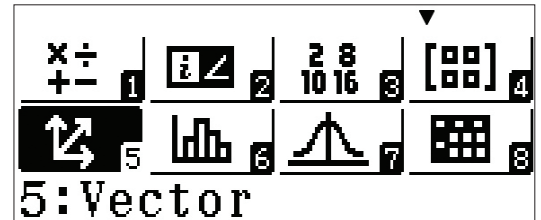


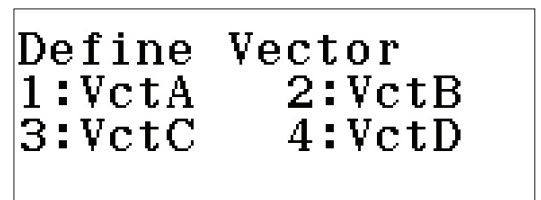
# VECTOR

The **fx-991EX** is capable of handling vector calculations with vectors in 2 or 3 dimensions.

From the Main Menu, use the arrow keys to highlight the Vector icon and press  $\square$  or press  $\boxed{5}$ .

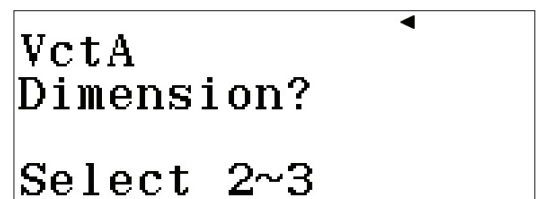


Let vectors **u** and **v** be defined in the 3-dimensional plane by the following:  $\mathbf{u} = 2\mathbf{i} + 3\mathbf{j} - 2\mathbf{k}$  and  $\mathbf{v} = 3\mathbf{i} - 4\mathbf{j} + 5\mathbf{k}$

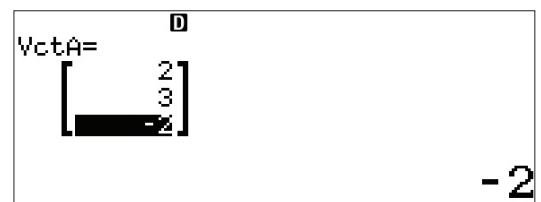


Define **u** as Vector **A** with dimension 3.

Press  $\boxed{1}$  (VctA)  $\boxed{3}$  (Dimension).



Enter the components of the vector and press  $\square$  after each one to move to the next value.

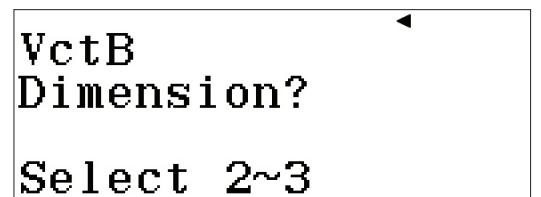


Define **v** as Vector **B** with dimension 3.

Press  $\boxed{\text{OPTN}}$   $\boxed{1}$  (Define Vector).



Press  $\boxed{2}$  (VctB)  $\boxed{3}$  (Dimension).



# VECTOR

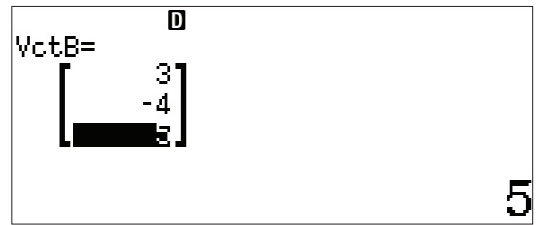
Enter the components of the vector and press  $\boxed{\text{=}}$  after each one to move to the next value.

To execute basic vector operations, press  $\boxed{\text{AC}}$  to enter Vector calculation.

Recall the names of the vectors and execute the desired operation by pressing  $\boxed{\text{OPTN}}$ .

Vector addition, subtractions, and multiplication are all available.

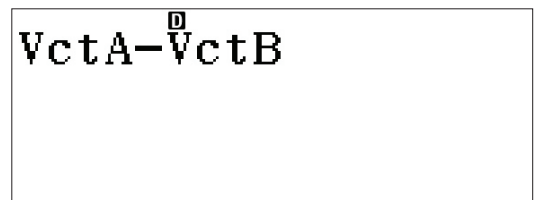
For subtraction, press  $\boxed{3}$  (VctA)  $\boxed{-}$   $\boxed{\text{OPTN}}$   $\boxed{4}$  (VctB)  $\boxed{\text{=}}$ .



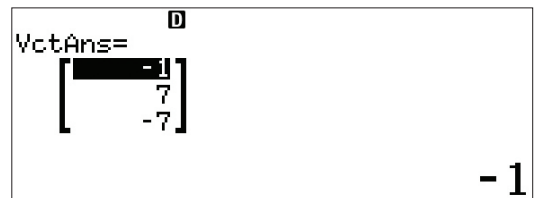
VctB=  $\begin{bmatrix} 3 \\ -4 \\ 5 \end{bmatrix}$  5



Vector



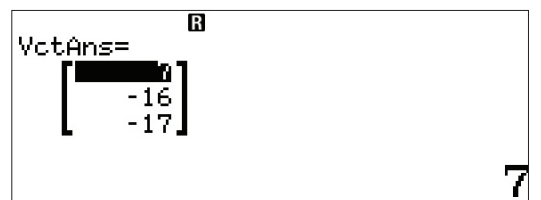
VctA - VctB



VctAns=  $\begin{bmatrix} -1 \\ 7 \\ -7 \end{bmatrix}$  -1

For multiplication, press

$\boxed{\text{OPTN}}$   $\boxed{3}$  (VctA)  $\boxed{\times}$   $\boxed{\text{OPTN}}$   $\boxed{4}$  (VctB)  $\boxed{\text{=}}$ .

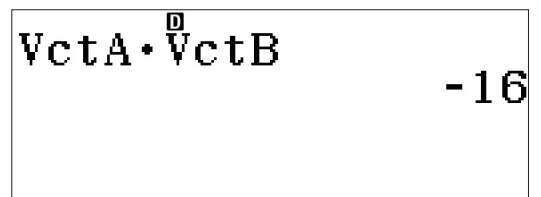


VctAns=  $\begin{bmatrix} -16 \\ -17 \end{bmatrix}$  7

The sums of the product of the components of a vector are known as the vector's dot product. So,

$$\mathbf{u} \cdot \mathbf{v} = (2 * 3) + (3 * -4) + (-2 * 5) = -16.$$

Press  $\boxed{\text{OPTN}}$   $\boxed{3}$  (VctA)  $\boxed{\text{OPTN}}$   $\boxed{\blacktriangledown}$   $\boxed{2}$  (Dot Product)  $\boxed{\text{OPTN}}$   $\boxed{4}$  (VctB)  $\boxed{\text{=}}$ .

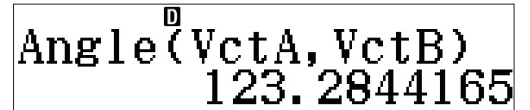


VctA \* VctB -16

# VECTOR

Even some very complex vector operations like the angle between vectors, which is defined as  $\cos^{-1} \frac{u \cdot v}{\|u\| \|v\|} = \theta$  in which  $\|v\| = \|2i + 3j - 2k\| = \sqrt{2^2 + 3^2 + (-2)^2} = |v|$  are easily accomplished on the **fx-991EX**.

To calculate vector cross product (not vector multiplication), press **OPTN** **▼** **3** (Angle) **OPTN** **3** (VctA) **SHIFT** **)** (,) **OPTN** **4** (VctB) **)** **=**.



Angle<sup>D</sup>(VctA, VctB)  
123.2844165