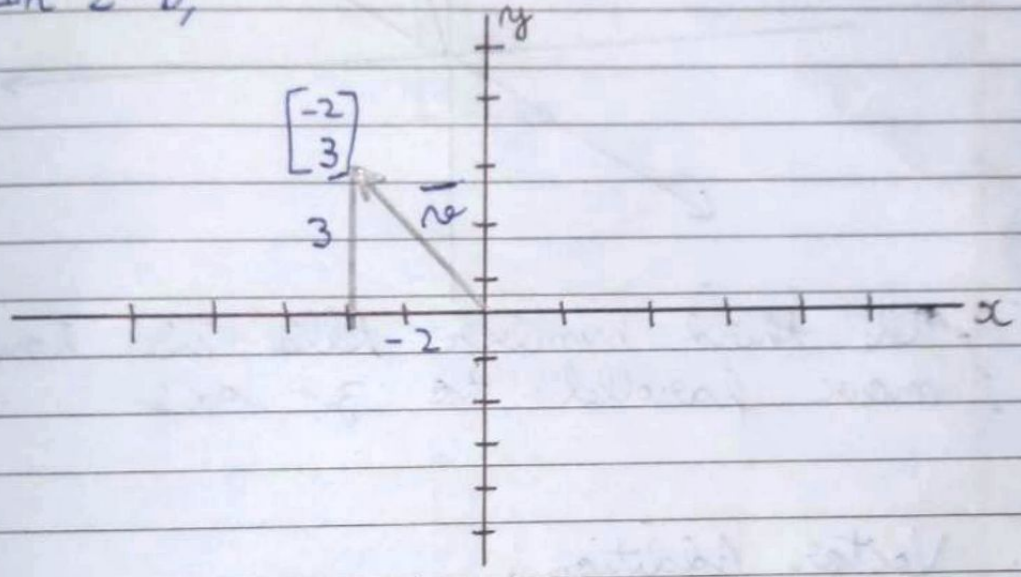
Vectors

Lecture-1

In linear algebra, almost everytime, our vector will be, rooted at the origin. Vectors are lists of numbers.

I. Vector Representation:

In 2-D,

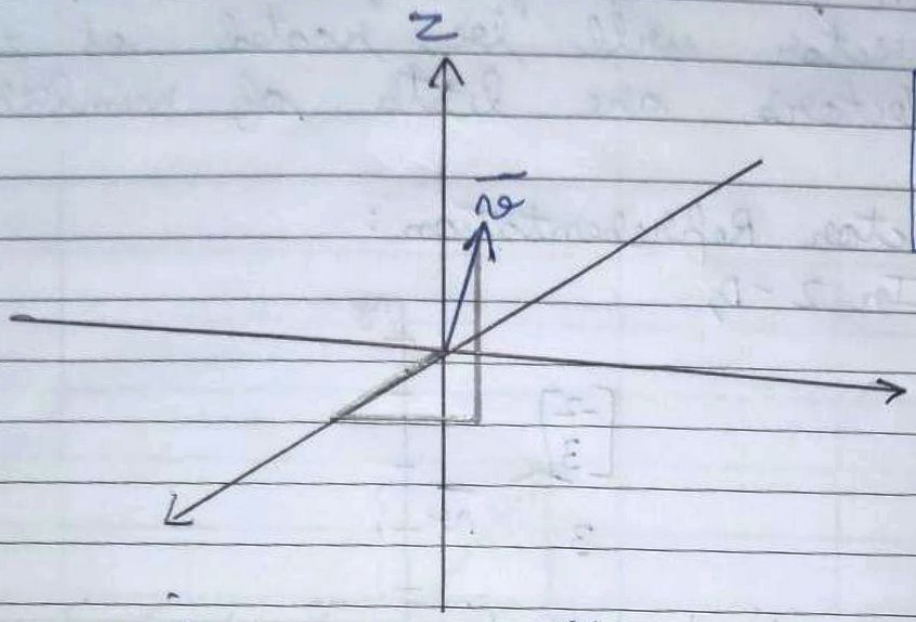


the co-ordinates of a vector tell us how to move from the tail of the vector to it's tip.

The first number tells us how much distance to move along the x-axis and the second number tells us, how far to move parallel to Y-axis.

Every pair of numbers give us one and only one vector and every vector is represented by only one pair of numbers.

In 3-D,

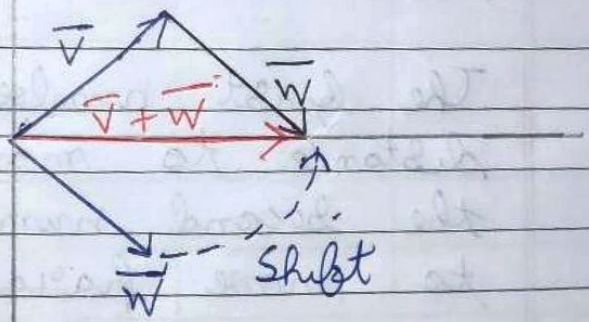


$$\begin{bmatrix} 2 \\ 1 \\ 3 \end{bmatrix}$$

The third number tells us how far to move parallel to z-axis.

II. Vector Addition:

Ex: $\begin{bmatrix} 1 \\ 2 \end{bmatrix} + \begin{bmatrix} -3 \\ 4 \end{bmatrix} = \begin{bmatrix} -2 \\ 6 \end{bmatrix}$

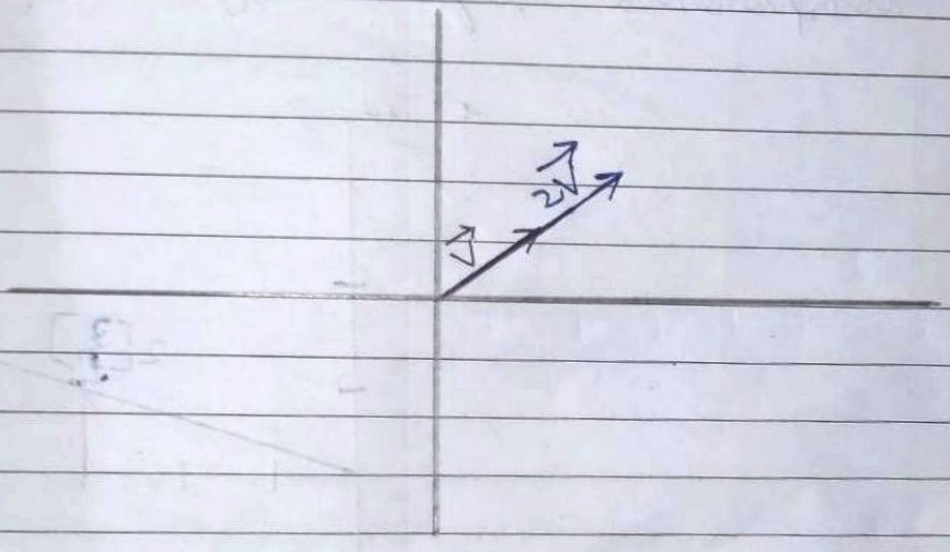


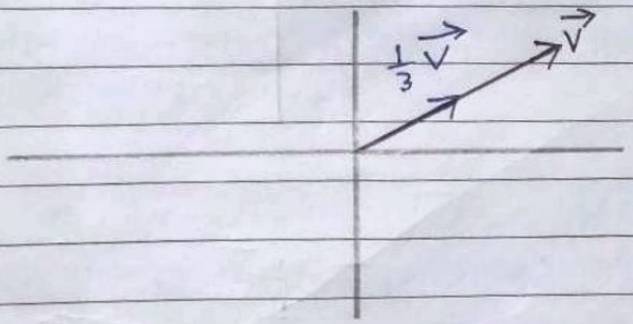
Why is it allowed to move the vector $\bar{w}$ away from origin?

Ans Each vector represents movement.

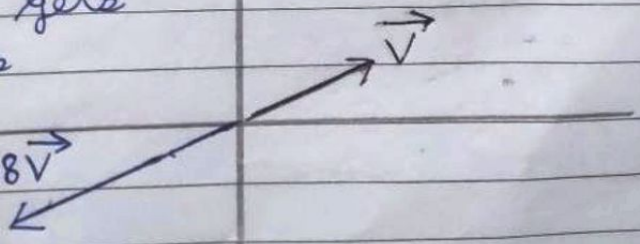
$$\begin{bmatrix} x_1 \\ y_1 \end{bmatrix} + \begin{bmatrix} x_2 \\ y_2 \end{bmatrix} = \begin{bmatrix} x_1 + x_2 \\ y_1 + y_2 \end{bmatrix}$$

III. Scaling :





The vector first gets flipped, the gets multiplied by a factor of -1.8.



The numbers which are multiplied with the vector, i.e. which scale the vector are called scalars.

Stretching a 2d vector by a factor of 2 means multiplying each of it's components by a factor of 2.