Assignment No.2

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Question taken from

https://github.com/gadepall/ncert/blob/main/linalg/vectors/gvv_ncert_vectors.pdf– Q.no.2.24

1 Question No.2.24

Find a unit vector in the direction of $\begin{pmatrix} 1 \\ 1 \\ -2 \end{pmatrix}$

2 Solution

To find the unit vector in the same direction as a vector, we divide it by its magnitude.

$$\vec{a} = 2i + 3j + k$$

putting the values of vector given in the problem

$$\vec{a} = 2 * 1 + 3 * 1 - 2$$

$$\vec{a} = 3$$

The modulus of the same can be calculated as

$$|\vec{a}| = \sqrt{1^2 + 1^2 + 2^2}$$

$$= \sqrt{1 + 1 + 4}$$

$$= \sqrt{6}$$

a =

$$\frac{\vec{a}}{|\vec{a}|}$$

Putting the values

a =

$$\frac{i + j - 2k}{\sqrt{6}}$$

=

$$\frac{1}{\sqrt{6}}i + \frac{1}{\sqrt{6}}j + \frac{2}{\sqrt{6}}k$$

a =0

Resulting zero vector is

$$\vec{0} = 0i + 0j + 0k$$

Thus the unit vector in the direction of $\begin{pmatrix} 1 \\ 1 \\ -2 \end{pmatrix}$ is

$$\frac{1}{\sqrt{6}}i + \frac{1}{\sqrt{6}}j + \frac{2}{\sqrt{6}}k$$

The points were plotted on graph, Follwoing graph is obtained with the help of python

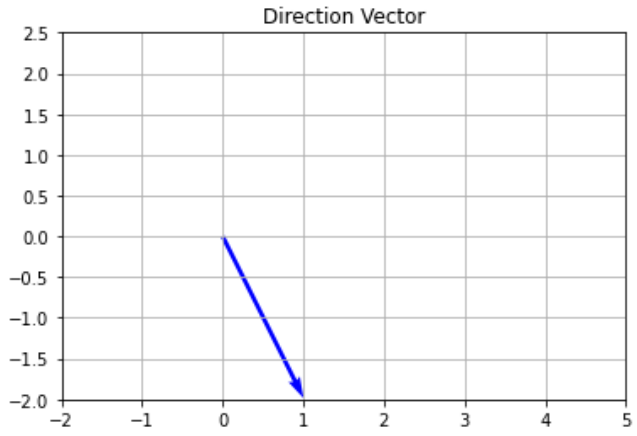

Fig. 2.1: Fig. 2.25