Assignment - 2

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***Abstract*—This is a simple document to learn about writing vectors and matrices using latex, draw figures using Python, Latex.**

Download all and latex-tikz codes from

```
svn co https://github.com/Ganeshyadav712/
    Assignment-2.git
```

1 Vectors
(Points and Vectors by G V V Sharma Exercises-Q.2.23)

2 Question No 1

Find a unit vector in the direction of a+b where, $\mathbf{a} = \begin{pmatrix} 2 \\ 2 \\ -5 \end{pmatrix}$ and $\mathbf{b} = \begin{pmatrix} 2 \\ 1 \\ 3 \end{pmatrix}$

3 Solution

Given, $\mathbf{a} = \begin{pmatrix} 2 \\ 2 \\ -5 \end{pmatrix}$, $\mathbf{b} = \begin{pmatrix} 2 \\ 1 \\ 3 \end{pmatrix}$

$$\mathbf{c} = \mathbf{a} + \mathbf{b} \tag{1}$$

$$= \begin{pmatrix} 2 \\ 2 \\ -5 \end{pmatrix} + \begin{pmatrix} 2 \\ 1 \\ 3 \end{pmatrix}$$

$$= \begin{pmatrix} 4 \\ 5 \\ -2 \end{pmatrix} \tag{2}$$

Magnitude of vector $\mathbf{c}$

$$\|\mathbf{c}\| = \sqrt{(4)^2 + (5)^2 + (-2)^2} \tag{3}$$

$$= \sqrt{16 + 25 + 4} = \sqrt{45} \tag{4}$$

The unit vector is calculated as

$$\frac{\mathbf{c}}{\|\mathbf{c}\|} = \frac{\begin{pmatrix} 4 \\ 5 \\ -2 \end{pmatrix}}{\left\| \begin{pmatrix} 4 \\ 5 \\ -2 \end{pmatrix} \right\|} \tag{5}$$

$$= \frac{1}{\sqrt{45}} \begin{pmatrix} 4 \\ 5 \\ -2 \end{pmatrix} \tag{6}$$