Assignment No.4

Valli Devi Bolla

Download all python codes from

https://github.com/Vallidevibolla/Assignment−4/blob/main/code.py

and latex-tikz codes from

https://github.com/Vallidevibolla/Assignment−4/blob/main/main.tex

Question taken from

https://github.com/gadepall/ncert/blob/main/linalg/linear_forms/gvv_ncert_linear_forms.pdf−Q.no.2.1

1 Question No.2.1

Check which of the following are solutions of the equation

$$\begin{pmatrix}1 & -2\end{pmatrix}\mathbf{x} = 4 \tag{1.0.1}$$

$$(a)\begin{pmatrix}0\\2\end{pmatrix}(b)\begin{pmatrix}4\\0\end{pmatrix}(c)\begin{pmatrix}2\\0\end{pmatrix}(d)\begin{pmatrix}\sqrt{2}\\4\sqrt{2}\end{pmatrix}(e)\begin{pmatrix}1\\1\end{pmatrix} \tag{1.0.2}$$

2 Solution

Given

$$\begin{pmatrix}1 & -2\end{pmatrix}\mathbf{x} = 4 \tag{2.0.1}$$

$$Let\mathbf{A} = \begin{pmatrix}0\\2\end{pmatrix} \tag{2.0.2}$$

$$\mathbf{B} = \begin{pmatrix}4\\0\end{pmatrix} \tag{2.0.3}$$

$$\mathbf{C} = \begin{pmatrix}2\\0\end{pmatrix} \tag{2.0.4}$$

$$\mathbf{D} = \begin{pmatrix}\sqrt{2}\\4\sqrt{2}\end{pmatrix} \tag{2.0.5}$$

$$\mathbf{E} = \begin{pmatrix}1\\1\end{pmatrix} \tag{2.0.6}$$

Let 'y' be the solution then equation be

$$\boxed{\mathbf{y} = \begin{pmatrix}1 & -2\end{pmatrix}\mathbf{x}} \tag{2.0.7}$$

Substitute(2.0.2)in (2.0.7)

$$\mathbf{x} = \mathbf{A} = \begin{pmatrix}0\\2\end{pmatrix} \text{in}(2.0.7) \tag{2.0.8}$$

$$\mathbf{y} = \begin{pmatrix}1 & -2\end{pmatrix}\begin{pmatrix}0\\2\end{pmatrix} \tag{2.0.9}$$

$$\boxed{\mathbf{y} = -4} \tag{2.0.10}$$

Substitute (2.0.3)in (2.0.7)

$$\mathbf{x} = \mathbf{B} = \begin{pmatrix}4\\0\end{pmatrix} \text{in}(2.0.7) \tag{2.0.11}$$

$$\mathbf{y} = \begin{pmatrix}1 & -2\end{pmatrix}\begin{pmatrix}4\\0\end{pmatrix} \tag{2.0.12}$$

$$\boxed{\mathbf{y} = 4} \tag{2.0.13}$$

Substitute(2.0.4)in (2.0.7)

$$\mathbf{x} = \mathbf{C} = \begin{pmatrix}2\\0\end{pmatrix} \text{in}(2.0.7) \tag{2.0.14}$$

$$\mathbf{y} = \begin{pmatrix}1 & -2\end{pmatrix}\begin{pmatrix}2\\0\end{pmatrix} \tag{2.0.15}$$

$$\boxed{\mathbf{y} = 2} \tag{2.0.16}$$

Substitute(2.0.5)in (2.0.7)

$$\mathbf{x} = \mathbf{D} = \begin{pmatrix}\sqrt{2}\\4\sqrt{2}\end{pmatrix} \text{in}(2.0.7) \tag{2.0.17}$$

$$\mathbf{y} = \begin{pmatrix}1 & -2\end{pmatrix}\begin{pmatrix}\sqrt{2}\\4\sqrt{2}\end{pmatrix} \tag{2.0.18}$$

$$\boxed{\mathbf{y} = -7\sqrt{2}} \tag{2.0.19}$$

Substitute (2.0.6)in (2.0.7)

$$\mathbf{x} = \mathbf{E} = \begin{pmatrix}1\\1\end{pmatrix} \text{in}(2.0.7) \tag{2.0.20}$$

$$\mathbf{y} = \begin{pmatrix}1 & -2\end{pmatrix}\begin{pmatrix}1\\1\end{pmatrix} \tag{2.0.21}$$

$$\boxed{\mathbf{y} = -1} \tag{2.0.22}$$

$\therefore$ x=$\begin{pmatrix}4\\0\end{pmatrix}$ i.e.,Point B is the solution of the equation $\begin{pmatrix}1 & -2\end{pmatrix}$x=4

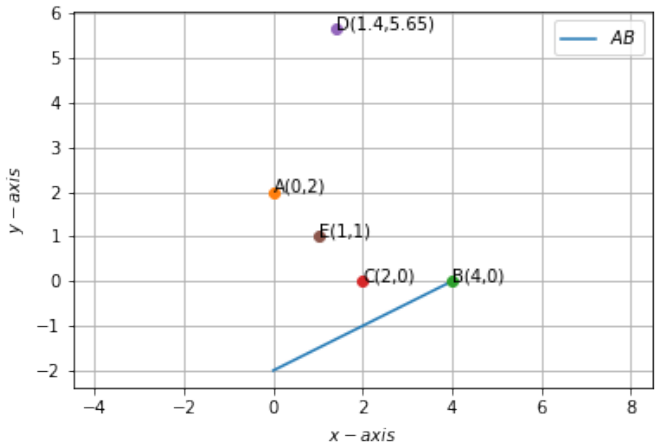

Fig. 2.1: Solution