ASSIGNMENT 1 - EE5600

RS Girish - EE20RESCH14005*

Contents

***Abstract*—This paper contains solution to problem no 17 of Lines and Planes section. Links to Python codes are available below.**

Download python codes using

https://github.com/rsgirishkumar/Assignment1/codes/

1 Problem

Find m if

$$\begin{pmatrix}2 & 3\end{pmatrix}\mathbf{x} = 11 \tag{1.0.1}$$

$$\begin{pmatrix}2 & -4\end{pmatrix}\mathbf{x} = -24 \tag{1.0.2}$$

$$\begin{pmatrix}m & -1\end{pmatrix}\mathbf{x} = -3 \tag{1.0.3}$$

2 Solution

Given, the system of equations in matrix equation format are as below

$$\begin{pmatrix}2 & 3\\ 2 & -4\\ m & -1\end{pmatrix}\mathbf{x} = \begin{pmatrix}11\\ -24\\ -3\end{pmatrix} \tag{2.0.1}$$

Step1: Assuming the system of equations are consistent, lets reduce the augmented matrix [A'b], to find the value of m.

$$\begin{aligned}&\begin{pmatrix}2 & 3 & 11\\ 2 & -4 & -24\\ m & -1 & -3\end{pmatrix}\\ &\xleftrightarrow{R_2\leftarrow R_2-R_1}\\ &\begin{pmatrix}2 & 3 & 11\\ 0 & -7 & -35\\ m & -1 & -3\end{pmatrix}\\ &\xleftrightarrow{R_3\leftarrow 2R_3+R_1}\\ &\begin{pmatrix}2 & 3 & 11\\ 0 & -7 & -35\\ 2m+2 & 1 & 5\end{pmatrix}\\ &\xleftrightarrow{R_3\leftarrow R_2+7R_3}\\ &\begin{pmatrix}2 & 3 & 11\\ 0 & -7 & -35\\ 14m+14 & 0 & 0\end{pmatrix}\end{aligned} \tag{2.0.2}$$

Since the system of equations are assumed consistent,

$$\begin{aligned}\Rightarrow 14m + 14 &= 0\\ \Rightarrow m &= -1\end{aligned} \tag{2.0.3}$$

Step2:The system of equations can be represented as vectors as below:

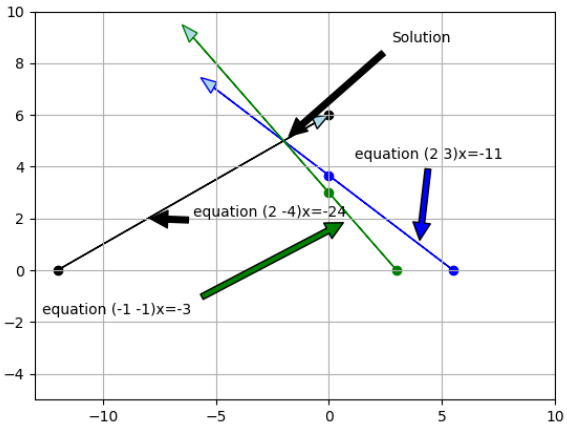

Fig. 0: System of Equations displaying intersecting at a point (-2 5).

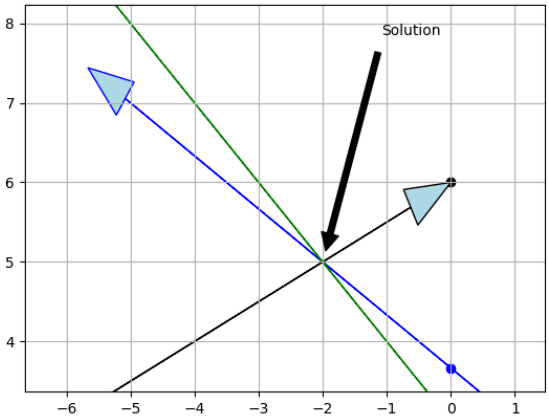

Fig. 0: A zoomed in view of System of Equations displaying intersecting at a point (-2 5).