EE5609: Matrix Theory
Assignment-1

Y.Pranaya
AI20MTECH14014

***Abstract*—This document contains a solution for a pair of given linear equations.**

Download the python codes from

https://github.com/pranaya14014/EE5609/tree/master/code

1 PROBLEM

Solve the following pair of linear equations

$$(8\ \ 5)\mathbf{x} = 9$$
$$(3\ \ 2)\mathbf{x} = 4$$

2 SOLUTION

Step 1: Construct the Augmented Matrix

$$\begin{pmatrix} 8 & 5 & 9 \\ 3 & 2 & 4 \end{pmatrix}$$

Step 2: Perform row operations to get a Row Echelon form:

$$\begin{pmatrix} 8 & 5 & 9 \\ 3 & 2 & 4 \end{pmatrix} \xleftrightarrow{R2 \to 8R2 - 3R1} \begin{pmatrix} 8 & 5 & 9 \\ 0 & 1 & 5 \end{pmatrix}$$
$$\begin{pmatrix} 8 & 5 & 9 \\ 0 & 1 & 5 \end{pmatrix} \xleftrightarrow{R1 \to R1 - 5R2} \begin{pmatrix} 8 & 0 & -16 \\ 0 & 1 & 5 \end{pmatrix}$$
$$\begin{pmatrix} 8 & 0 & -16 \\ 0 & 1 & 5 \end{pmatrix} \xleftrightarrow{R1 \to \frac{R1}{8}} \begin{pmatrix} 1 & 0 & -2 \\ 0 & 1 & 5 \end{pmatrix}$$

Above final matrix is in the reduced Echelon form and from this matrix we get the solution. Last column represents the solution of the given linear equation.

Hence the solution is of the given linear equations $(8\ \ 5)\mathbf{x} = 9$, $(3\ \ 2)\mathbf{x} = 4$ is $\begin{pmatrix} -2 & 5 \end{pmatrix}$

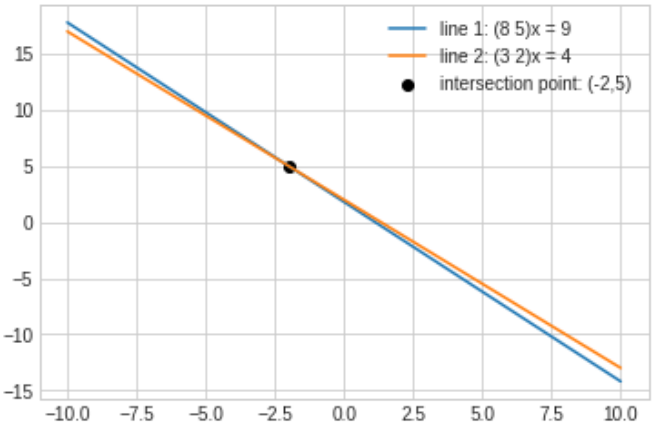

Fig. 0: Linear equations plot generated using python