Matrix Theory(EE5609) Assignment 11

Anshum Agrawal
Roll No- AI20MTECH11006

***Abstract*—This document solves a system of given equations**

Download latex-tikz codes from

https://github.com/anshum0302/EE5609/blob/master/assignment11/assign11.tex

1 PROBLEM STATEMENT

The system of equations:

$$1.x + 2.x^2 + 3.xy + 0.y = 6$$
$$2.x + 1.x^2 + 3.xy + 1.y = 5$$
$$1.x - 1.x^2 + 0.xy + 1.y = 7$$

1) has solutions in rational numbers
2) has solutions in real numbers
3) has solutions in complex numbers
4) has no solution

Solution:

Writing given equations in matrix form	$\begin{pmatrix} 1 & 2 & 3 & 0 \\ 2 & 1 & 3 & 1 \\ 1 & -1 & 0 & 1 \end{pmatrix} \begin{pmatrix} x \\ x^2 \\ xy \\ y \end{pmatrix} = \begin{pmatrix} 6 \\ 5 \\ 7 \end{pmatrix}$
row reduction of the augmented matrix	$\begin{pmatrix} 1 & 2 & 3 & 0 & 6 \\ 2 & 1 & 3 & 1 & 5 \\ 1 & -1 & 0 & 1 & 7 \end{pmatrix} \xleftrightarrow[R_3=R_3-R_1]{R_2=R_2-2R_1} \begin{pmatrix} 1 & 2 & 3 & 0 & 6 \\ 0 & -3 & -3 & 1 & -7 \\ 0 & -3 & -3 & 1 & 1 \end{pmatrix} \xleftrightarrow{R_3=R_3-R_2} \begin{pmatrix} 1 & 2 & 3 & 0 & 6 \\ 0 & -3 & -3 & 1 & -7 \\ 0 & 0 & 0 & 0 & 8 \end{pmatrix}$ Third row of above matrix represents equation $0.x + 0.x^2 + 0.xy + 0.y = 8$ $\implies 0 = 8$ Thus system of equation is inconsistent
Conclusion	Option 4) is correct option 1),2) and 3) are incorrect

TABLE 1: Solving system of given equation