Matrix theory Assignment 19

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***Abstract*—This document contains the concept of matrix diagonalization.**

Download all python codes from

https://github.com/shivangi−975/EE5609−Matrix_Theory/tree/master/Assignment19/Codes

Download latex-tikz codes from

https://github.com/shivangi−975/EE5609−Matrix_Theory/blob/master/Assignment19/Assignment_19.tex

1 Problem

Let A be a 3×3 matrix with real entries.Identify the correct statements.

1.A is necessarily diagonalizable over **R**

2.If A has distinct real eigen values than it is diagonalizable over**R**

3.If A has distinct eigen values than it is diagonalizable over **C**

4.If all eigen values are non zero than it is diagonalizable over **C**

2 Solution

Given	A 3×3 matrix with real entries.
Statement 1.	A is necessarily diagonalizable over $\mathbf{R}$
False statement	matrix A is diagonalizable if and only if there is a basis of $\mathbf{R}^3$consisting of eigenvectors of A. Counter example : $\begin{pmatrix} 1 & 1 & 0 \\ 0 & 1 & 1 \\ 0 & 0 & 4 \end{pmatrix}$
Statement 2.	If A has distinct real eigen values than it is diagonalizable over$\mathbf{R}$
True statement	A has n linearly independent eigenvectors which implies it is diagonalizable.
Statement 3.	If all eigen values are non zero than it is diagonalizable over $\mathbf{C}$
True statement	A has n linearly independent eigenvectors which implies it is diagonalizable.
Statement 4.	If all eigen values are non zero than it is diagonalizable over $\mathbf{C}$
False statement	matrix A is diagonalizable if and only if there is a basis of $\mathbf{R}^3$consisting of eigenvectors of A.

TABLE 1: Summary