Name and section: ——————————————————————————

Instructor's name: ——————————————————————————

1. Find eigenvalues and eigenvectors of the matrix $\begin{bmatrix} 5 & -4 \\ 2 & -1 \end{bmatrix}$. Check whether the given matrix is diagonalizable or not? If it is diagonalizable, then express the given matrix in form $S^{-1}DS$.

2. Check whether the given matrix $A = \begin{bmatrix} 1 & 1 & 1 \\ 0 & 0 & 1 \\ 0 & 0 & 1 \end{bmatrix}$ is diagonalizable or not?

3. Check whether the given matrix $A = \begin{bmatrix} -1 & -1 & -1 \\ -1 & -1 & -1 \\ -1 & -1 & -1 \end{bmatrix}$ is diagonalizable or not? If not, then justify your answer and if yes then find the matrix S such that $A = S^{-1}DS$

4. Find the eigen basis and its dimension of the matrix $\begin{bmatrix} 1 & 1 & 0 \\ 0 & -1 & -1 \\ 2 & 2 & 0 \end{bmatrix}$

5. Check whether
$$A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 4 & 6 \\ 3 & 6 & 9 \end{bmatrix}.$$

   is diagonalizable or not. If it is diagonalizable then using the diagonal matrix find the rank and determinant of A. Also find A^5.

6. Find the solution of system of equations

$$\begin{aligned} x - 3y + 5z &= 1 \\ 2x - 4y + 7z &= 1 \\ -x - 2y + z &= 1 \end{aligned}$$

   using LU factorization method.