



Program: BS (CS)
Semester: Fall-2019
Course: MT104-Linear Algebra
Instructor Name: Mr. Osama Sohrab

Examination: Assignment # 04
Total Marks: 10, Weightage: **04**
Date of Submission: 02 / 12 / 2019
Batch : 18

Note: Attempt all questions

Problem 1 Find the least squares solution(s), least squares error vector and the least squares error of the linear system $A\vec{x} = \vec{b}$.

(a) $A = \begin{bmatrix} 1 & -1 \\ 2 & 3 \\ 4 & 5 \end{bmatrix}; \mathbf{b} = \begin{bmatrix} 2 \\ -1 \\ 5 \end{bmatrix}$ (b) $A = \begin{bmatrix} 1 & 0 & -1 \\ 2 & 1 & -2 \\ 1 & 1 & 0 \\ 1 & 1 & -1 \end{bmatrix}; \mathbf{b} = \begin{bmatrix} 6 \\ 0 \\ 9 \\ 3 \end{bmatrix}$

Problem 2 Find all eigenvalues and the corresponding eigenvectors of the matrix

$$M = \begin{bmatrix} -3 & 1 & -3 \\ 20 & 3 & 10 \\ 2 & -2 & 4 \end{bmatrix}.$$

Problem 3 Diagonalize the following matrix, if possible.

$$A = \begin{bmatrix} 1 & 3 & 3 \\ -3 & -5 & -3 \\ 3 & 3 & 1 \end{bmatrix}$$

Problem 4 For any two matrices $A = \begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix}$ and $B = \begin{bmatrix} b_{11} & b_{12} \\ b_{21} & b_{22} \end{bmatrix}$ in M_{22} show that the function defined by $\langle A, B \rangle = a_{11}b_{11} + 2a_{12}b_{12} + 3a_{21}b_{21} + 4a_{22}b_{22}$ is an inner product.

The End