

Linear Algebra
Summer Final Exam

Total: 50 Marks

Note: Submission time 25-09-2020 before 6:00 pm (3 Hrs)
Students who have not attempted mid term exam, must download and solve 80 marks paper only

Question No: 1

10 marks

Find the eigenvalues of A

$$A = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ 4 & -17 & 8 \end{bmatrix}$$

Question No. 2

10 marks

Find a matrix P that diagonalizes the below matrix

$$A = \begin{bmatrix} 0 & 0 & -2 \\ 1 & 2 & 1 \\ 1 & 0 & 3 \end{bmatrix}$$

Question No. 3

10 marks

Determine whether the vectors form linear dependent or independent sets.

$$V_1 = (1, -2, 3)$$

$$V_2 = (5, 6, -1)$$

$$V_3 = (3, 2, 1)$$

Question No. 4

20 marks

What are the four main things we need to define for a vector space? Which of the following is a vector space over \mathbb{R} ? For those that are not vector spaces, modify one part of the definition to make it into a vector space.

- a. $V = \{ 2 \times 2 \text{ matrices with entries in } \mathbb{R} \}$, usual matrix addition, and

$$k \cdot \begin{pmatrix} a & b \\ c & d \end{pmatrix} = \begin{pmatrix} ka & b \\ kc & d \end{pmatrix} \text{ for } k \in \mathbb{R}$$

- b. $V = \{ \text{Polynomials with complex coefficients of degrees } \leq 3 \}$, with usual addition and scalar multiplication of polynomials.

