To be presented in front of class by Roll no. 34,35,36 after lecture (if any)

Due date: 26-01-2022

Roll no: 34

- Prove/Disprove the following subsets is/are subspace of vector space $M_{n\times n}(\mathbb{R})$. (Where $M_{n\times n}(\mathbb{R})$ is real vector space of $n\times n$ real matrices with usual matrix addition and scaler multiplications.)
  - The set of all $n\times n$ real symmetric matrices. i.e., $\left\{A\in M_{n\times n}(\mathbb{R})\mid A^T = A\right\}$
  - The set of all $n\times n$ real invertible matrices. i.e., $\left\{A\in M_{n\times n}(\mathbb{R})\mid A \text{ is invertible}\right\}$

- Find three vectors in $\mathbb{R}^3$ which are linearly dependent and are such that any two of them are linearly independent.
- Find the dimension and a basis for the subspace spanned by following vectors.
  1. $u=(1,0,1), v=(1,-1,1), w=(1,1,1)$
  2. $v_1=(1,1,1,1), v_2=(0,1,2,1), v_3=(1,2,3,2), v_4=(1,2,3,4)$

Roll no: 35

- Prove/Disprove the following subsets is/are subspace of vector space $M_{n\times n}(\mathbb{R})$. (Where $M_{n\times n}(\mathbb{R})$ is real vector space of $n\times n$ real matrices with usual matrix addition and scaler multiplications.)
  - The set of all $n\times n$ real skew-symmetric matrices. i.e., $\{A\in M_{n\times n}(\mathbb{R})|\ A^T=-A\}$
  - The set of all $n\times n$ real non-invertible matrices. i.e., $\{A\in M_{n\times n}(\mathbb{R})|\ A \text{ is not invertible}\}$

- Find four vectors in $\mathbb{R}^4$ which are linearly dependent and are such that any three of them are linearly independent.
- Find the dimension and a basis for the subspace spanned by following vectors.
  1. $u=(1,-2,3), v=(0,1,0), w=(1,0,1)$
  2. $v_1=(1,1,1,1), v_2=(0,-1,-2,-1), v_3=(1,0,0,0), v_4=(3,-2,-4,-2)$

Roll no: 36

- Prove/Disprove the following subsets is/are subspace of vector space $M_{n\times n}(\mathbb{R})$. (Where $M_{n\times n}(\mathbb{R})$ is real vector space of $n\times n$ real matrices with usual matrix addition and scaler multiplications.)
    - The set of all $n\times n$ real idempotent matrices. i.e., $\{A\in M_{n\times n}(\mathbb{R})|\ A^2 = A\}$
    - The set of all $n\times n$ real matrices that commute with some fixed real $n\times n$ matrix B. i.e., $\{A\in M_{n\times n}(\mathbb{R})|\ AB = BA\}$

- Find three vectors in $\mathbb{R}^3$ which are linearly dependent and are such that none of them is scaler multiple of other.
- Find the dimension and a basis for the subspace spanned by following vectors.
    1. $u = (-1,0,1), v = (1,0,1), w = (0,1.2,0)$
    2. $v_1 = (1,0,0,1), v_2 = (0,1,2,0), v_3 = (1,2,-4,2)$
