

**LINEAR ALGEBRA (MA20105)**

Class Test (2020)- I:

$\mathbb{R}$  will denote the field of real numbers

**Answer all question!**

1. Every set containing linearly independent set is linearly independent. If true write 1, else write 0.

Answer: 0

2. Let  $V = \{(x, y, z) \in \mathbb{R}^3 : x + y + z = 1\}$ . Then  $V$  is a subspace of  $\mathbb{R}^3$ . If true write 1, else write 0.

Answer: 0

3. Let  $A, B$  be square matrices. If  $I - AB$  is invertible, then  $I - BA$  is also invertible. If true write 1, else write 0.

Answer: 1

4. The linear span of the vectors  $(1, 2), (3, 4)$  is  $\mathbb{R}^2$ . If true write 1, else write 0.

Answer: 1

5. The set  $\{(0, 0), (1, 0), (0, 1)\}$  is linearly independent. If true write 1, else write 0.

Answer: 0

6. Write down the dimension of the nullspace of the following matrix

$$\begin{bmatrix} 1 & 2 & 0 & 1 \\ 0 & 1 & 1 & 0 \\ 1 & 2 & 0 & 1 \end{bmatrix}.$$

Answer: 2

7. Write down the dimension of the column space of the following matrix

$$\begin{bmatrix} -1 & 1 & 0 & 0 \\ -1 & 0 & 1 & 0 \\ 0 & -1 & 1 & 0 \\ 0 & -1 & 1 & 0 \end{bmatrix}.$$

Answer: 2

8. Is it possible to write down the  $LU$  decomposition of the following matrix, where  $L$  and  $U$  are invertible? If yes write 1, else write 0.

$$\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 8 & 9 & 12 \end{bmatrix}.$$

Answer: 1

9. Two planes in  $\mathbb{R}^3$  always intersect in a straight line or they do not intersect. If true write 1, else write 0.

Answer: 0

10. If  $Ax = 0$  has a non-trivial solution, then  $Ax = b$  has a non-trivial solution. If true write 1, else write 0.

Answer: 0

11. Write down the dimension of the Left nullspace of the following matrix

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 0 & 1 \end{bmatrix}.$$

Answer 0.

- 12 Write down the rank of the following matrix

$$\begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}.$$

Answer: 0

- 13 Write down the rank of the following matrix

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}.$$

Answer: 3

- 14 Write down the rank of the following matrix

$$\begin{bmatrix} 1 & 2 & 3 \\ 2 & 4 & 6 \end{bmatrix}.$$

Answer: 1