

NPTEL Basic Linear Algebra 2020

Assignment 1 - Subjective

Course Instructor: Prof. I. K. Rana

Course TA: S. Venkitesh

Deadline: Wednesday, February 12, 2020, 23:59 IST

- (1) Let L_1 and L_2 be lines in the plane, such that the x -intercepts of L_1 and L_2 are 5 and -1 respectively, and that the respective y -intercepts are 5 and 1. Then at which point do L_1 and L_2 intersect? [2]

- (2) Use Gaussian elimination to convert the following matrices to REF.

(a)

$$\begin{bmatrix} 1 & 1 & 1 \\ 1 & 3 & 3 \\ 1 & 3 & 6 \end{bmatrix} \quad [2]$$

(b)

$$\begin{bmatrix} 1 & 1 & 1 & 1 \\ 1 & 0 & 1 & 1 \\ 1 & 0 & 1 & 0 \end{bmatrix} \quad [2]$$

(c)

$$\begin{bmatrix} 1 & 1 & 1 \\ 1 & 2 & 2 \\ 2 & 3 & -4 \end{bmatrix} \quad [2]$$

- (3) For what values of c does the following system have a solution?

$$x - y - 3z = 3, \quad 2x + z = 0, \quad 2y + 7z = c. \quad [4]$$

- (4) For which values of k does the following system have no solution?

$$x + ky = 1, \quad kx + y = 1. \quad [3]$$

- (5) Consider the following system of equations.

$$-m_1x + y = b_1, \quad -m_2x + y = b_2.$$

(a) Prove that if $m_1 \neq m_2$, then the system has exactly one solution. [2]

(b) Suppose $m_1 = m_2$. Find the conditions under which the system is consistent. [3]