

Assignment I
Due September 4
Maximum 25

1. Determine all possible values of s and t for which the following system will have (i) no solution, (ii) a unique solution and (iii) infinitely many solutions.

In case of (ii) and (iii) find all the solutions.

$$3x - 2y + sz = 1$$

$$2x + y + 5z = 2t$$

$$3x + 4y + 2z = 3$$

2.

$$x - 2y + 3z + w = 3$$

$$2x + y - z + 2w = 4$$

a. Use Gaussian Elimination to solve this system of equations and find ALL the solutions.

b. Does this system have any solutions that are all positive? Justify your answer.

c. Does this system have any solutions such that $x + y + z + w = 0$? If yes, find one and if not, explain why not.

3. a. If $AX = B$ has infinitely many solutions, how many solutions are possible for $AX = C$ for some other C ? Justify your answer.

b. Is it true that any $n \times n$ matrix is row equivalent to a triangular matrix? Why?

4. a. Name two non zero 3×3 matrices A and B whose product $AB = 0$

b. Compute BA . Is it 0? If it is, is it always true that if $AB = 0$ then $BA = 0$?

c. Is there a matrix C such that $AC \neq 0$?

5.

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

Find all matrices A such that $AB = BA$.