

Linear Algebra Assignment 1

Doğukan Celik

20200808071

1

a

$$\left[\begin{array}{ccc|c} 1 & 2 & 3 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{array} \right]$$

No. ~~Because~~ It has infinitely many solutions depending on 2 parameters.

Because we have 3 unknowns and rank of the augmented matrix is 1.

Thus,

$3 - 1 = 2$ parameters should be used.

b

$$\left[\begin{array}{ccc|c} 1 & 2 & 3 & 0 \\ 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{array} \right]$$

No.

System has no solutions.

c

$$\left[\begin{array}{ccc|c} 1 & 2 & 3 & 0 \\ 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{array} \right]$$

$$\text{rank}([A|b]) = 3$$

$$\text{rank}(A) = 2$$

Thus the values above are not equal,
the ~~linear~~ system is inconsistent when m equals 1.

d

No. Explained in sections 1.a and 1.b.

e

If $m=1$, then the system has no solutions.

If $m \neq 0$ and $m \neq 1$, then the system has one solution.

2

$$\begin{bmatrix} 1 & 2 & 6 & 2 \\ 0 & 1 & 2k & 0 \\ k & 0 & 2 & 1 \end{bmatrix}$$

This system should have no solution.

Gaussian elimination \rightarrow

$$\begin{bmatrix} 1 & 2 & 6 & 2 \\ 0 & 1 & 2k & 0 \\ 0 & 0 & 4k^2 - 6k + 2 & 1 - 2k \end{bmatrix}$$

We want this system to have no solution.
For this, $4k^2 - 6k + 2 = 0$ and $1 - 2k \neq 0$
conditions ~~should~~ be satisfied.
must

$$4k^2 - 6k + 2 = 0$$

$$\begin{array}{rcl} 2k & & -2 \\ 2k & & -1 \end{array}$$

$$k = 1$$

$$k = \frac{1}{2}$$

← Cancels the value.

$$k \neq \frac{1}{2}$$

$$k = \{1\}$$

2

Dajukan Celik

20200808071

2

5

As we know,

$$C_{ij} = \sum_{k=1}^n a_{ik} b_{kj}, \text{ for } i=1, \dots, m \text{ or } j=1, \dots, p,$$

where m and p are lengths of the matrices.

Thus,

$$C_{21} = \sum_{k=1}^{10} a_{2k} b_{k1}$$

$$C_{21} = a_{21} b_{11} + a_{22} b_{21} + \dots + a_{210} b_{101}$$

$$C_{21} = \frac{1}{2.3} + \frac{1}{3.4} + \dots + \frac{1}{11.12}$$

$$C_{21} = \frac{5}{12}$$

4

Değerler Çelt
20200808071

[Signature]