$$R_i \to cR_i + kR_j$$

$$R_3 \to R_2 + R_1$$

GAURAV SINGH to Everyone 7:18 PM

GS

sir I am getting confused between linear independent column and linear independent solution ? can you explain once

😱 1

A

Suppose the parametric form of the solutions to $Ax = 0$ looks like following –

Dimensions of A - $A_{20\times 30}$

$n = 30$ ← total variables

$$x = s\begin{bmatrix} \star \\ \star \\ \star \\ \vdots \\ 1 \\ 0 \\ 0 \end{bmatrix} + t\begin{bmatrix} \star \\ \star \\ \star \\ \vdots \\ 0 \\ 1 \\ 0 \end{bmatrix} + p\begin{bmatrix} \star \\ \star \\ \star \\ \vdots \\ 0 \\ 0 \\ 1 \end{bmatrix}$$

Number of Linearly independent columns in A ?

27

no. of free variables = 3

Pivot = 27

- n LI vectors can fill the space R^n

Can you try proving it?

- if you have more than 3 vectors in R^2 then they are definately LD.

- if a vector can be represented as linear combination of L I vectors then it must be unique comb.

in other words

- if a vector can be represented as linear combination of L D vectors then it must be inf many ways.

- less than 5 vectors in R^5 can not fill the space.

Consider a 3×3 matrix, A ($\neq [0]_{3\times3}$). Which of the following is(are) possible number of free columns in A?

a. 0

b. 1

c. 2

d. 3

3 2

Consider the system of m linear equations in n variable with m>n

I. Ax=b always have a solution. Where b is a non-zero vector ✗

II. Ax=b have a solution only if b=0 ✗

III. There exists a system which does not have solution.

Which one of the following is **INCORRECT**?

A. Statement I

B. Statement II

C. Statement III

D. All of the above

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

R^3 R^2

A, B Answers

Mark all the correct statements:

a. A consistent system with no free columns will have a unique solution.

b. A system with free columns will have no solution. [redacted]

c. A consistent system with free columns will have infinite solution.

d. A system with free columns will have infinite solutions. [redacted]

$Ax = b$

$\left\{ \begin{bmatrix} 0 & 0 & 0 \end{bmatrix} \right. \begin{bmatrix} \; \end{bmatrix}^{x} = \begin{bmatrix} \; \end{bmatrix}$

LI

$$
\begin{array}{c}
\begin{array}{cccc} & \text{free} & & \\ & \downarrow & & \end{array} \\
\left[\begin{array}{ccc|c}
\boxed{\cdot} & * & & \\
 & 0 & \boxed{\cdot} & \\
0 & 0 & 0 & \text{Nonzero}
\end{array}\right]
\end{array}
$$

No soln

$$
\begin{array}{c}
\begin{array}{cccc} & \text{free} & & \\ & \downarrow & & \end{array} \\
\left[\begin{array}{ccc|c}
\boxed{\cdot} & * & & \\
 & 0 & \boxed{\cdot} & \\
0 & 0 & 0 & 0
\end{array}\right]
\end{array}
$$

soln exist

(inf soln)

A consistent system with no free columns will have a unique solution.

$\Downarrow$

there is a sol^n

$\Updownarrow$

b is a Linear comb. of columns of A

$$\begin{bmatrix} \ & \ & \ \end{bmatrix}\begin{bmatrix} \ \end{bmatrix} = \begin{bmatrix} \ \end{bmatrix}$$

Columns are LI

$$b = c_1\begin{bmatrix} \ \end{bmatrix} + c_2\begin{bmatrix} \ \end{bmatrix} + c_3\begin{bmatrix} \ \end{bmatrix}$$

Which of the following statements is/are true? (MSQ - 1 mark)

A) A linear system whose equations are all homogenous must be consistent

B) Multiplying a row of an augmented matrix through by zero is an acceptable elementary row operation

C) A single linear equation with 2 or more unknowns will have infinitely many solutions

D) If number of equations in a linear system exceeds the #unknowns, then, solution must be inconsistent

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$[x+y+z=5]$

If number of equations in a linear system exceeds the #unknowns, then, solution must be inconsistent

$x+y=3$

$x-y=5$

$x+y=3$

$x-y=5$

$x=2-(s+t)$

$x+y+z=2$

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

$y=s \quad z=t$

$\begin{bmatrix} 2-(s+t) \\ s \\ t \end{bmatrix}$

$$\begin{array}{cccc} \text{pivot} & \text{free} & \text{free} & \\ \left[\boxed{1}\right. & 1 & 1 & \left|\ 2\right] \end{array}$$

$y = s$ $\qquad\qquad$ $x + s + t = 2$

$z = t$ $\qquad\qquad$ $x = 2 - (s+t)$

Given matrix A(m*n) s.t. Ax = b. Consider below statements : (MCQ - 2 marks)

S1) If b is LD on cols of matrix, then it need not always have a unique solution
S2) If cols of matrix are LD, then above system of equation can have a unique solution.

A) S1 and S2 are true
B) S1 and S2 are false
C) S1 is true and S2 is false
D) S2 is true and S1 is false

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log

rank $(A|b) > \text{rank}(A)$

1.5 hrs

2.5 months