

$$R_i \rightarrow cR_i + \kappa R_j$$



$$R_3 \rightarrow R_2 + R_1$$



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 -  $A_{20 \times 30}$

$$\left[ \begin{array}{ccccccccc} \downarrow & \downarrow \\ f & f & f & f & f & f & f & f & f \end{array} \right]$$

$\leftarrow$  total variables  
 $n = 30$

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

Number of Linearly independent columns in A ?

$\overbrace{\quad\quad\quad}^{27}$

No. of free variables = 3

Pivot = 27

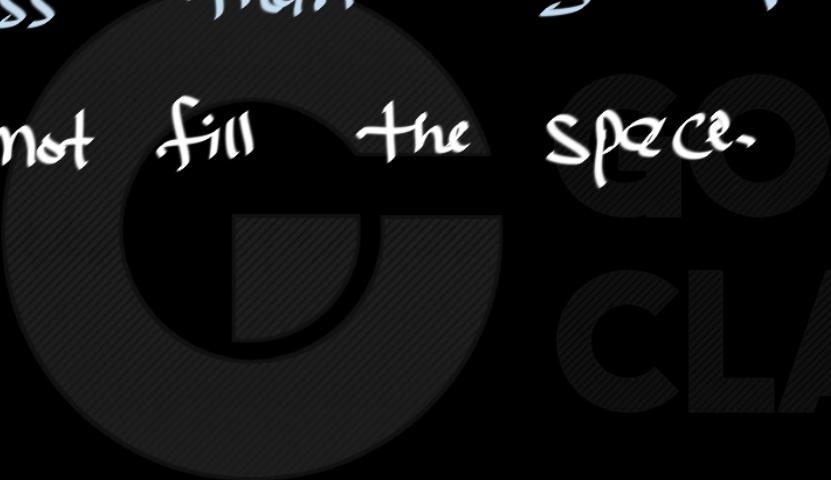
- {. n LI vectors can fill the space  $\mathbb{R}^n$
- {. Can you try proving it?
- {. if you have more than 3 vectors in  $\mathbb{R}^2$   
then they are definitely LD.

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

in other words

• if a vector can be represented  
as linear combination of LD vectors  
then it must be inf many ways

- less than 5 vectors in  $\mathbb{R}^5$  can not fill the space.



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

- a. 0 ✓
- b. 1 ✓
- c. 2 ✓
- d. 3

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  $\times$
- II.  $Ax=b$  have a solution only if  $b=0$   $\times$
- 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

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

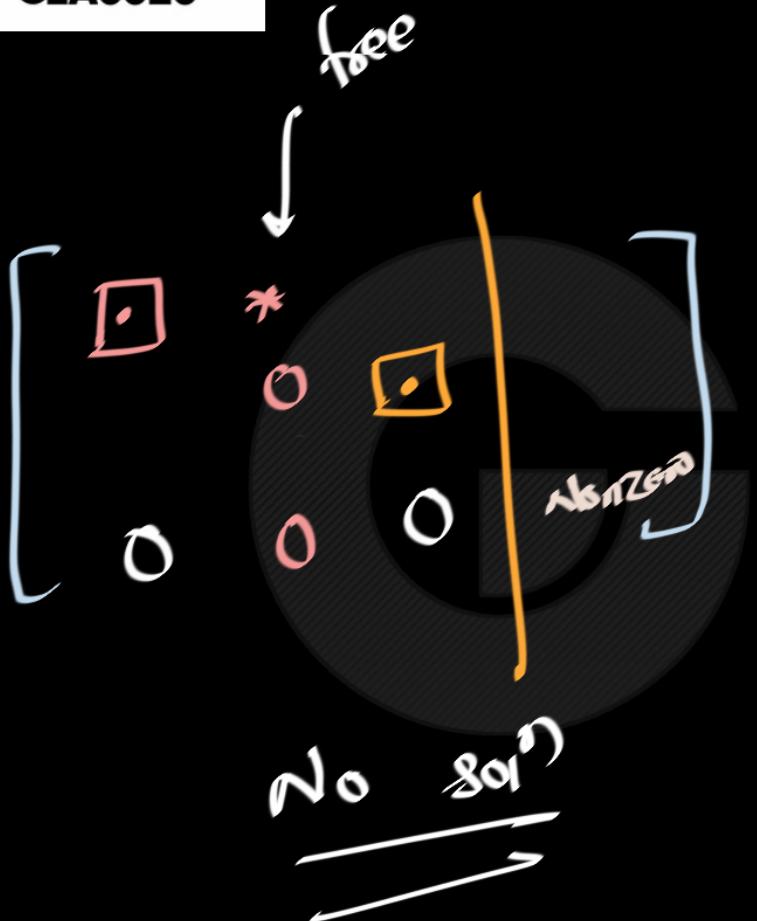
$\downarrow_{\mathbb{R}^3} \quad \downarrow_{\mathbb{R}^2}$

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.
- ✓ c. A consistent system with free columns will have infinite solution.
- ✗ d. A system with free columns will have infinite solutions.

$$\left\{ \begin{matrix} \downarrow & \downarrow \\ A_n = b & \end{matrix} \right. \quad \left\{ \begin{matrix} [000] & [x] \\ \underbrace{\hspace{1cm}}_{LI} & \end{matrix} \right. = \left[ \right]$$



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free

0 0 0 | 0 0 0

No soln

soln exist  
(inf soln)

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



there is a sol<sup>n</sup>  
 b is a linear comb. of columns of A

$$\begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix} = \begin{bmatrix} ] \\ ] \\ ] \end{bmatrix}$$

Columns are LI

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

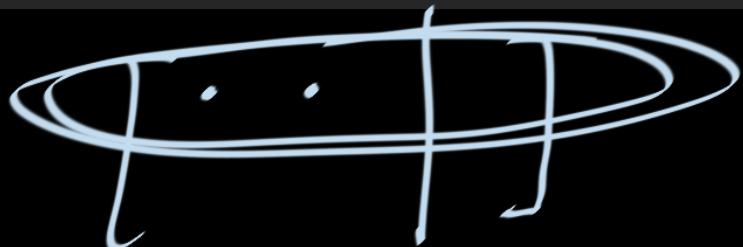


Which of the following statements is/are true? (MSQ - 1 mark)

- 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

$$\begin{aligned}x+y &= 3 \\x-y &= 5\end{aligned}$$

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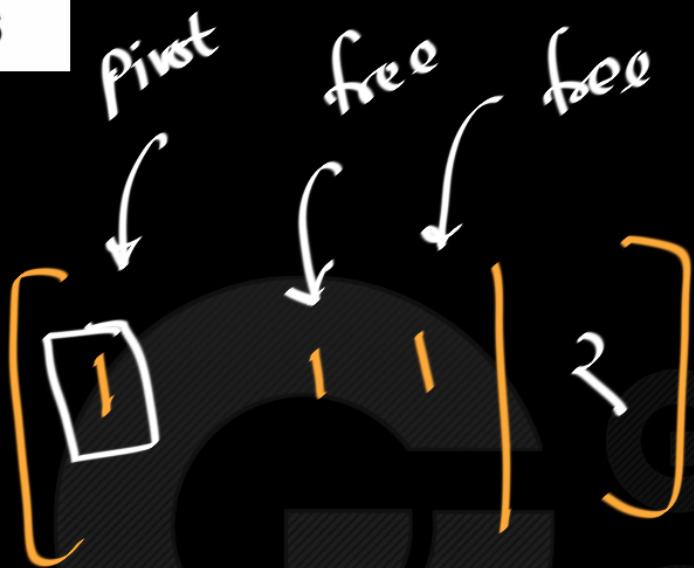
$$\begin{aligned}x+y+z &= 2 \\x+y &= 3 \\x-y &= 5\end{aligned}$$

$$\left[ \begin{array}{ccc|c} 1 & 1 & 1 & 2 \\ 1 & 1 & -1 & 3 \\ 1 & -1 & 5 & 5 \end{array} \right]$$

$$y = s \quad z = t$$

$$x = 2 - (s+t)$$

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



$$j = s$$

$$z = t$$

$$x + s+t = 2$$

$$x = 2 - (s+t)$$

Given matrix  $A(m \times n)$  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

$$\left[ \begin{array}{c} \text{rank } (A|b) > \text{rank}(A) \\ \rightarrow \\ \text{I-shots} \\ \hline \text{Q-S moments} \end{array} \right]$$

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