May 2021

$Q1.$ Consider the system of linear equations given by $Ax = b$, where $A = \begin{bmatrix} 1 & 0 & 3 \\ 2 & 4 & 5 \\ 7 & 8 & 19 \end{bmatrix}$,

$x = \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix}$ and $b = \begin{bmatrix} 4 \\ 11 \\ 34 \end{bmatrix}$. The row echleon form of the matrix A is given by

$R = \begin{bmatrix} 1 & 0 & 3 \\ 0 & 1 & \frac{-1}{4} \\ 0 & 0 & 0 \end{bmatrix}$.

The given system of linear equations $Ax = b$ has,

Options:

A. A unique solution and the solution is $x = \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$.

B. No Solution

C. Infinitely many solutions

D. A unique solution and the solution is $x = \begin{bmatrix} -2 \\ \frac{5}{4} \\ 2 \end{bmatrix}$.

Jan 2022

$Q2$. From the list of given terms find out the best possible options for each of the given subquestions:

1) Rank
2) Limit
3) Determinant
4) Closure with respect to addition and scalar multiplication
5) Existence of zero element
6) Existence of additive inverse
7) Communitative of addition
8) Associativity of addition
9) Elements
10) Local maxima
11) Local minima
12) Saddle points
13) Gradient
14) Directional Derivative
15) Partial Derivative
16) Set of orthonoraml vectors
17) Standard ordered basis
18) Affine spaces

Gram-Schmidt algorithm generates a __________. (Enter the best possible option (only one). Enter
only the serial number of that option.) [Suppose your answer is 7, 14 and 17, then you should enter 71417]

Jan 2023

$Q3$. For what values of a, does the system of linear equations $x + y - z = 0$, $2x + 3y + z = 0$, and $ax + y + z = 0$ have infinitely many solutions?

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$Q4$. If $\begin{pmatrix} a+2 & b+c-1 \\ b-c+1 & d \end{pmatrix} = 3I$, where I denote the 2×2 identity matrix, the what is the determinant of $\begin{pmatrix} a & b \\ c & d \end{pmatrix}$

Sept 2023

$Q5$. Consider the following system:

$$x + 2y - 2z = b_1$$
$$2x + 5y - 4z = b_2$$
$$4x + 9y - 8z = b_3$$

What conditions should b_1, b_2, b_3 satisfy so that this system has at least one solution?

Options:

A. $2b_1 + b_2 - b_3 = 0$
B. $b_2 = 2b_1$
C.$b_3 = 4b_1$
D. This system always has a solution for any set of values for b_1, b_2, b_3
D. This system does not have a solution for any set of value of b_1, b_2, b_3