

Quiz

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Section

A

Subject

Differentiation equation

Semester

Summer

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Q No 2)

(1)

$$x + 3y + 5z + 2t = 2$$

$$-y + 3z + 4t = 0$$

$$2x + y + 9z + 6t = -3$$

$$3x + 2y + 4z + 8t = -1$$

Sol:.

using gauss jordan method

$$x + 3y + 5z + 2t = 2$$

$$-y + 3z + 4t = 0$$

$$2x + y + 9z + 6t = -3$$

$$3x + 2y + 4z + 8t = -1$$

writing in matrix form system

$$2x + y + 3z + 5z = 2$$

$$x - y + 3z = 0$$

$$6t + 2x + y + 9z = -3$$

$$8t + 3x + 2y + 4z = -1$$

2	1	3	5	2
0	1	-1	3	0
-6	2	1	9	-3
8	3	2	4	-1

(2)

$$= \begin{bmatrix} 2 & 0 & 4 & 2 & 2 \\ 0 & 1 & -1 & 3 & 0 \\ 6 & 2 & 1 & 9 & -3 \\ 8 & 3 & 2 & 4 & -1 \end{bmatrix}$$

Multiplying row 2 by -1 and
add to row 1

$$= \begin{bmatrix} 2 & 0 & 4 & 2 & 2 \\ 0 & 1 & -1 & 3 & 0 \\ 6 & 0 & 3 & 3 & -3 \\ 8 & 3 & 2 & 4 & -1 \end{bmatrix}$$

Multiplying row 2 by
-2 and add it row 3

$$= \begin{bmatrix} 2 & 0 & 4 & 2 & 2 \\ 0 & 1 & -1 & 3 & 0 \\ 6 & 0 & 3 & 3 & -3 \\ 8 & 0 & 5 & -5 & -1 \end{bmatrix}$$

Multiply row 2 by -3
and add it to
row 4

$$= \begin{bmatrix} 1 & 0 & 2 & 1 & 1 \\ 0 & 1 & -1 & 3 & 0 \\ 6 & 0 & 3 & 3 & -3 \\ 8 & 0 & 5 & -3 & -1 \end{bmatrix}$$

Divide the row by
2

$$= \begin{bmatrix} 1 & 0 & 2 & 1 & 1 \\ 0 & 1 & -1 & 3 & 0 \\ 2 & 0 & 1 & 1 & -1 \\ 8 & 0 & 5 & -5 & -1 \end{bmatrix}$$

Divide the 3 by 3

(3)

$$= \begin{bmatrix} 1 & 0 & 2 & 1 & 1 \\ 0 & 1 & -1 & 3 & 0 \\ 0 & 0 & -3 & -1 & -3 \\ 8 & 0 & 5 & -5 & -1 \end{bmatrix}$$

Multiply row 1 by 2
and add it to row 3

$$= \begin{bmatrix} 1 & 0 & 2 & 1 & 1 \\ 0 & 1 & -1 & 3 & 0 \\ 0 & 0 & -3 & -1 & -3 \\ 0 & 0 & -11 & -13 & -9 \end{bmatrix}$$

Multiply row 1 by -8 and
add it to row 4

$$= \begin{bmatrix} 1 & 0 & 2 & 1 & 1 \\ 0 & 1 & -1 & 3 & 0 \\ 0 & 0 & 3 & 1 & 3 \\ 0 & 0 & 11 & 13 & 9 \end{bmatrix}$$

Multiply the row 3
by -1

$$= \begin{bmatrix} 1 & 0 & 2 & 1 & 1 \\ 0 & 1 & -1 & 3 & 0 \\ 0 & 0 & 3 & 1 & 3 \\ 0 & 0 & 11 & 13 & 9 \end{bmatrix}$$

Multiply the row 4 by -1

(4)

$$= \begin{bmatrix} 1 & 0 & -1 & 0 & -2 \\ 0 & 1 & -1 & 3 & 0 \\ 0 & 0 & 3 & 1 & 3 \\ 0 & 0 & 1 & 3 & 9 \end{bmatrix}$$

multiply row 3 by -1
and add it to row 2

$$\cong \begin{bmatrix} 1 & 0 & -1 & 0 & -2 \\ 0 & 1 & -10 & 0 & -9 \\ 0 & 0 & 3 & 1 & 3 \\ 0 & 0 & -28 & 0 & -30 \end{bmatrix}$$

multiply row 3 by -13
and add it to row 4

$$\cong \begin{bmatrix} 1 & 0 & -1 & 0 & -2 \\ 0 & 1 & -10 & 0 & -9 \\ 0 & 0 & 3 & 1 & 3 \\ 0 & 0 & 1 & 0 & 15/14 \end{bmatrix}$$

Divide row 4
by -28

$$\cong \begin{bmatrix} 1 & 0 & 0 & 0 & -13/14 \\ 0 & 1 & -10 & 0 & -9 \\ 0 & 0 & 3 & 1 & 3 \\ 0 & 0 & 1 & 0 & 15/14 \end{bmatrix}$$

Add row 4 to row 1

$$\cong \begin{bmatrix} 1 & 0 & 0 & 0 & -13/14 \\ 0 & 1 & 0 & 0 & 12/7 \\ 0 & 0 & 3 & 1 & 3 \\ 0 & 0 & 1 & 0 & 15/14 \end{bmatrix}$$

multiply 4 by 8 and
add it to row 2

$$\cong \begin{bmatrix} 1 & 0 & 0 & 0 & -13/14 \\ 0 & 1 & 0 & 0 & 12/7 \\ 0 & 0 & 1 & 0 & 15/14 \\ 0 & 0 & 1 & 0 & 15/14 \end{bmatrix}$$

multiply 4 by -3 and
add it to row 3

(8)

Convert the augmented matrix in the system of linear equation

$$t = -13/14$$

$$x = 12/17$$

$$z = +3/14$$

$$y = 15/14$$

This possible solution of system is ordered 4 type

$$(t, x, y, z) = \left(-13/14, 12/17, 15/14, +3/14\right)$$

Check if the given ordered 4 type is a solution of system of equation

$$\begin{cases} 12/17 + 3x + 15/14 + 5x(-3/14) + 2z(-13/14) = 2 \\ -13/14 + 3x(-3/14) + 12/17 = 0 \\ 2x + 12/17 + 15/14 + 9x(-3/14) + 6x(-13/14) = -3 \\ 3x + 12/17 + 2x + 15/14 + 4z(-3/14) + 8x(-13/14) = -1 \end{cases}$$

(8) (6)

Simplify the equation

$$2 = 2$$

$$0 = 0$$

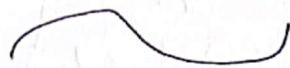
$$-3 = -3$$

$$-1 = -1$$

Since all the equalities are true so the ordered 4 type is

the solution of system.

$$(x, y, z) = \left(-\frac{13}{14}, \frac{12}{7}, \frac{13}{14}, -\frac{3}{14}\right)$$



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