

Day. M T W T F S

Date: ___/___/___

Quiz # 1

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Checked By: Parents: Excellent Good 

Solve the following a system of equation.

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

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

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

$$3x + 2y + 14z + 8t = -1$$

Solution

Using gaussian elimination
to find solution of the system of
equation.

$$\left[\begin{array}{cccc|c} 1 & 3 & 5 & 2 & 2 \\ 0 & -1 & 3 & 4 & 0 \\ 2 & 1 & 9 & 6 & -3 \\ 3 & 2 & 4 & 8 & -1 \end{array} \right]$$

Using elementary
Row operation

$$\begin{array}{l} R_3 - 2R_1 \\ R_4 - 3R_1 \end{array} \left[\begin{array}{cccc|c} 1 & 3 & 5 & 2 & 2 \\ 0 & -1 & 3 & 4 & 0 \\ 0 & -5 & -1 & 2 & -7 \\ 0 & -7 & -11 & 2 & -7 \end{array} \right]$$

$$\begin{array}{l} R_3 - 5R_2 \\ R_4 - 7R_2 \end{array} \left[\begin{array}{cccc|c} 1 & 3 & 5 & 2 & 2 \\ 0 & -1 & 3 & 4 & 0 \\ 0 & 0 & -16 & -18 & -7 \\ 0 & 0 & -32 & -26 & -7 \end{array} \right]$$

$$= \begin{bmatrix} 1 & 3 & 5 & 2 & 2 \\ 0 & -1 & 3 & 4 & 0 \\ 0 & 0 & -16 & -18 & -7 \\ 0 & 0 & -32 & -26 & -7 \end{bmatrix}$$

$$= \begin{bmatrix} 1 & 3 & 5 & 2 & 2 \\ 0 & -1 & 3 & 4 & 0 \\ 0 & 0 & -16 & -18 & -7 \\ 0 & 0 & 0 & 10 & -7 \end{bmatrix}$$

$R_4 - 2R_3$

$$\begin{array}{l} R_1 - 2 \\ -R_2 \\ -\frac{1}{10}R_3 \\ \frac{1}{10}R_4 \end{array} \begin{bmatrix} -1 & 1 & 3 & 0 & 0 \\ 0 & 1 & -3 & -4 & 0 \\ 0 & 0 & -16 & -18 & \frac{7}{10} \\ 0 & 0 & 0 & 10 & \frac{7}{10} \end{bmatrix}$$

Now we have the equation

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

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

$$z + \frac{7}{8}t = \frac{7}{10}$$

$$\boxed{t = \frac{7}{10}}$$

Now eq (ii)

$$z + \frac{7}{8} \left(\frac{7}{10} \right) = \frac{7}{10}$$

$$z + \frac{63}{80} = \frac{7}{10}$$

$$= \frac{35 - 63}{80}$$

$$= \frac{-28}{80}$$

$$= \frac{-7}{20}$$

$$\boxed{z = -\frac{7}{20}}$$

Now eq. ii

$$y - 3\left(-\frac{7}{20}\right) - 4\left(\frac{7}{10}\right) = 0$$

$$y + \frac{21}{20} - \frac{14}{5} = 0$$

$$y = \frac{14}{5} - \frac{21}{20} = \frac{56 - 21}{20} = \frac{35}{20}$$

$$\boxed{y = \frac{7}{4}}$$

Now eq. iii

$$-x + \frac{7}{4} + 3\left(-\frac{7}{20}\right) = 0$$

$$x = -\frac{21}{20} + \frac{7}{4} = \frac{-21 + 35}{20}$$

$$= \frac{14}{20}$$

$$\boxed{x = \frac{7}{10}}$$

check

we have equation

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

= putting value

$$= -\left(\frac{7}{4}\right) + 3\left(-\frac{7}{20}\right) + 4\left(\frac{7}{10}\right) = 0$$

$$= -\frac{7}{4} - \frac{21}{20} + \frac{28}{10} = 0$$

L.C.M

$$= \frac{-35 - 21 + 56}{20} = 0$$

$$\frac{-56 + 56}{20}$$

$$\frac{0}{20} = 0$$

$$0 = 0$$

okay.