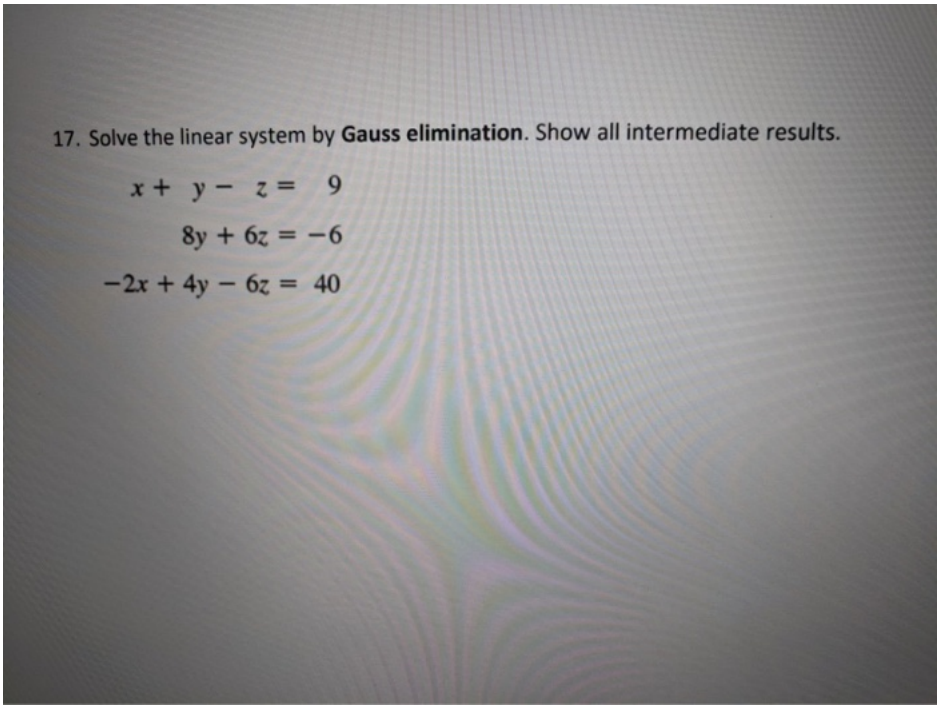
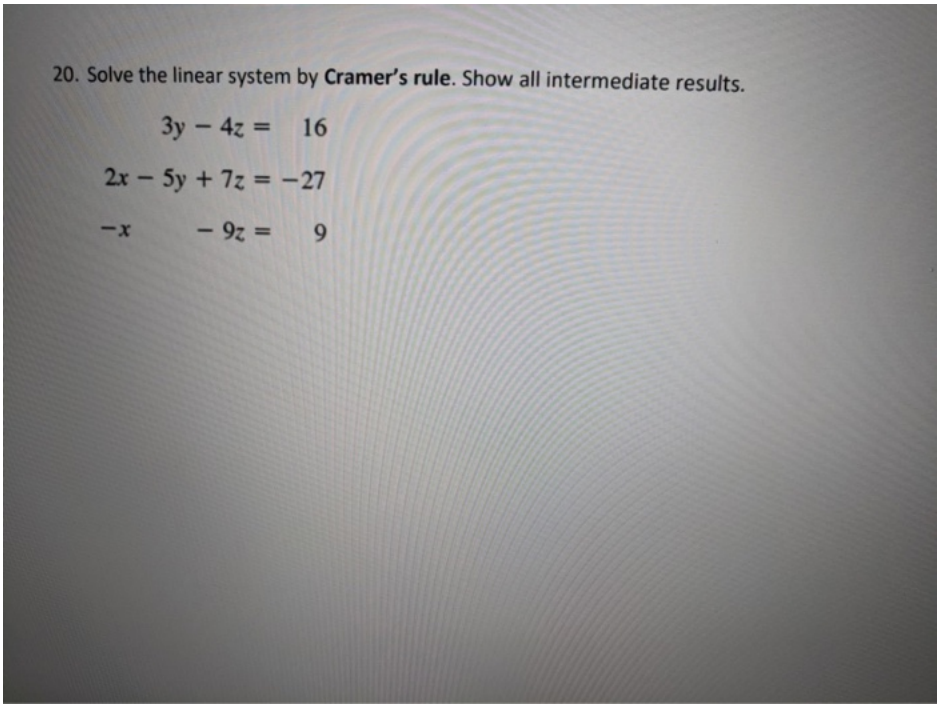
Question: 17. Solve the linear system by Gauss elimination. Show all inter...





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Expert Answer

Anonymous answered this

$8y+6z$

$-2x+4y-6z=40$

The augmented matrix is

$$\left[\begin{array}{ccc|c} 1 & 1 & -1 & 9 \\ 0 & 8 & 6 & -6 \\ -2 & 4 & -6 & 40 \end{array}\right]$$

$R_3 \to R_3+2R_1$

$$\left[\begin{array}{ccc|c} 1 & 1 & -1 & 9 \\ 0 & 8 & 6 & -6 \\ 0 & 6 & -8 & 58 \end{array}\right]$$

$R_2 \to R_2/8$

$$\left[\begin{array}{ccc|c} 1 & 1 & -1 & 9 \\ 0 & 1 & 6/8 & -6/8 \\ 0 & 6 & -8 & 58 \end{array}\right]$$

$R_3 \to R_3-6R_2$

$$\left[\begin{array}{ccc|c} 1 & 1 & -1 & 9 \\ 0 & 1 & 6/8 & -6/8 \\ 0 & 0 & -\frac{25}{2} & 125/2 \end{array}\right]$$

From back substitution.

$\Rightarrow \frac{-25}{2}z = \frac{125}{2}$

$\Rightarrow \boxed{z=-5}$

$y+\frac{6}{8}z=-\frac{6}{8}$

$\Rightarrow y = -\frac{6}{8}-\frac{6}{8}\times(-5)$

$= -\frac{6}{8}+\frac{30}{8} = \frac{24}{8} = 3$

$\Rightarrow \boxed{y=3}$

Also $x+y-z=9$

$x = 9-y+z$

$= 9-3-5 = 1$

$\Rightarrow \boxed{x=1}$

$\therefore \boxed{x=1}, \boxed{y=3}, \boxed{z=-5}$

$$2x - 5y + 7z = -27$$
$$-x - 9z = 9$$

Augmented matrix is

$$\left[\begin{array}{ccc|c} 0 & 3 & -4 & 16 \\ 2 & -5 & 7 & -27 \\ -1 & 0 & -9 & 9 \end{array}\right]$$

Using cramer rule,

$$D = \begin{vmatrix} 0 & 3 & -4 \\ 2 & -5 & 7 \\ -1 & 0 & -9 \end{vmatrix}$$

$$= -2(-27 - 0) - 1(21 - 20)$$

$$= 54 - 1 = 53$$

$$D_x = \begin{vmatrix} 16 & 3 & -4 \\ -27 & -5 & 7 \\ 9 & 0 & -9 \end{vmatrix}$$

$$= 9(21 - 20) - 9(-80 + 81)$$

$D_x = 0$

$$D_y = \begin{vmatrix} 0 & 16 & -4 \\ 2 & -27 & 7 \\ -1 & 9 & -9 \end{vmatrix}$$

$= -2(-144+36) - 1(112-108)$

$= -2(-108) - 1(4)$

$= 216 - 4 = 212$

$$D_z = \begin{vmatrix} 0 & 3 & 16 \\ 2 & -5 & -27 \\ -1 & 0 & 9 \end{vmatrix}$$

$= -2(27-0) - 1(-81+80)$

$= -54 - 1(-1) = -54 + 1 = -53$

Hence $x = \frac{D_x}{D} = \frac{0}{53} = 0$

$y = \frac{D_y}{D} = \frac{212}{53} = 4$

$z = \frac{D_z}{D} = \frac{-53}{53} = -1$

$\therefore \boxed{x = 0}, \boxed{y = 4}, \boxed{z = -1}.$

Comment

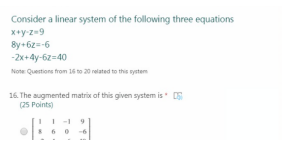
Practice with similar questions

Q: 17. Solve the linear system by Gauss elimination. Show all intermediate results. x + y - z= 9 8y + 6z = -6 - 2x + 4y - 6z = 40 20. Solve the linear system by Cramer's rule. Show all intermediate results. 3y - 4z = 16 2x - 5y + 72 = -27 -x - 92= 9

A: See answer

Up next for you in Advanced Math

Consider a linear system of the following three equations



See answer

If n(A) = 25, n(B) = 24, n(C) = 23, n(A ∩ B) = 7, n(A ∩ C) = 10, n(B ∩ C) = 6, and n(A ∪ B ∪ C) = 53, find n(A ∩ B ∩ C).

See answer

See more questions for subjects you study

2x1 + 3x2 3x1 + 2x2 x1 + 2x2 4. 2x1 + 5x2 3x1 + 4x2 + + + + + 3x3 2x3 X3 2x3 3x3 5 5 16 5 2 = - 4x3 1 = 3x3 3 8x3 4 17x3 1 3x3 2x4 2 + 8x3 6x4 5 + 5x3 2x4 4 +

A: See answer

Q: Find the inverse by Gauss-Jordan elimination. Show all intermediate results -4 0 0 0 8 13 0 3 5

A: See answer

Show more