

QUIZ 2 Solutions - MATH 225

Question. Use Gauss-Jordan elimination to determine the solution set to the given system

Morning session

$$\begin{aligned}2x - y - z &= 2, \\4x + 3y - 2z &= -1, \\x + 4y + z &= 4.\end{aligned}$$

Its augmented matrix is $\left[\begin{array}{ccc|c} 2 & -1 & -1 & 2 \\ 4 & 3 & -2 & -1 \\ 1 & 4 & 1 & 4 \end{array} \right]$. We apply the following operations in order

$P_{13}, A_{12}(-4), A_{13}(-2), M_3(-\frac{1}{3}), M_2(-1), A_{32}(-4), A_{23}(-3), M_3(-\frac{1}{5}), A_{32}(-2), A_{31}(-1), A_{21}(-4)$.

Then we get $\left[\begin{array}{ccc|c} 1 & 0 & 0 & 3 \\ 0 & 1 & 0 & -1 \\ 0 & 0 & 1 & 5 \end{array} \right]$, so $(3, -1, 5)$ is the solution for the system.

Afternoon session

$$\begin{aligned}x - 3y + z &= 8, \\5x - 4y + z &= 15, \\2x + 4y - 3z &= -4.\end{aligned}$$

Its augmented matrix is $\left[\begin{array}{ccc|c} 1 & -3 & 1 & 8 \\ 5 & -4 & 1 & 15 \\ 2 & 4 & -3 & -4 \end{array} \right]$. We apply the following operations in order

$A_{12}(-5), A_{13}(-2), A_{32}(-1), A_{23}(-10), M_3(-\frac{1}{15}), A_{32}(-1), A_{31}(-1), A_{21}(3)$.

Then we get $\left[\begin{array}{ccc|c} 1 & 0 & 0 & 1 \\ 0 & 1 & 0 & -3 \\ 0 & 0 & 1 & -2 \end{array} \right]$, so $(1, -3, -2)$ is the solution for the system.