

Answer on Question #58274 – Math –Linear Algebra

Question

Solve gauss elimination

- $w-x+3y-3z=3$
 $2w-3x+y-11z=1$
 $5w-2x+5y-4z=5$
 $3w+4x-7y+2z=-7$

Solution

$$\begin{array}{ll} w-x+3y-3z=3 & (1) \\ 2w-3x+y-11z=1 & (2) \\ 5w-2x+5y-4z=5 & (3) \\ 3w+4x-7y+2z=-7 & (4) \end{array}$$

$$\begin{array}{ll} w-x+3y-3z=3 & (1) \\ -x-5y-5z=-5 & (2)-2\times(1) \\ 3x-10y+11z=-10 & (3)-5\times(1)=(3)^* \\ 7x-16y+11z=-16 & (4)-3\times(1)=(4)^* \end{array}$$

$$\begin{array}{ll} w-x+3y-3z=3 & (1) \\ x+5y+5z=5 & 2\times(1)-(2)=(2)^* \\ 3x-10y+11z=-10 & (3)-5\times(1)=(3)^* \\ 7x-16y+11z=-16 & (4)-3\times(1)=(4)^* \end{array}$$

$$\begin{array}{ll} w-x+3y-3z=3 & (1) \\ x+5y+5z=5 & 2\times(1)-(2)=(2)^* \\ -25y-4z=-25 & (3)^*-3\times(2)^* \\ -51y-24z=-51 & (4)^*-7\times(2)^*=(4)^\sim \end{array}$$

$$\begin{array}{ll} w-x+3y-3z=3 & (1) \\ x+5y+5z=5 & (2)^* \\ y+4/25z=1 & ((3)^*-3\times(2)^*)/(-25)=(3)^\sim \\ -51y-24z=-51 & (4)^*-7\times(2)^*=(4)^\sim \end{array}$$

$$\begin{array}{ll} w-x+3y-3z=3 & (1) \\ x+5y+5z=5 & (2)^* \\ y+4/25z=1 & ((3)^*-3\times(2)^*)/(-25)=(3)^\sim \\ (-24+51\times 4/25)z=0 & (4)^\sim+51\times(3)^\sim \end{array}$$

$$\begin{aligned} z &= 0 \\ y &= 1 \\ x + 5 &= 5 \\ w - x + 3 &= 3 \end{aligned}$$

$$\begin{aligned} z &= 0 \\ y &= 1 \\ x &= 0 \\ w &= 0 \end{aligned}$$

Answer: $z=0, y=1, x=0, w=0$.

Question

Solve gauss elimination

$$2. \begin{cases} 3x_1 + 2x_2 + x_3 = 3 \\ 2x_1 + x_2 + x_3 = 0 \\ 6x_1 + 2x_2 + 4x_3 = 6 \end{cases}$$

Solution

$$\begin{aligned} 3x_1 + 2x_2 + x_3 &= 3 & (1) \\ 2x_1 + x_2 + x_3 &= 0 & (2) \\ 6x_1 + 2x_2 + 4x_3 &= 6 & (3) \end{aligned}$$

$$\begin{aligned} 3x_1 + 2x_2 + x_3 &= 3 & (1) \\ x_1 + x_2 &= 3 & (1) - (2) = (2)^* \\ -6x_1 - 6x_2 &= -6 & (3) - 4 \times (1) = (3)^* \end{aligned}$$

$$\begin{aligned} 3x_1 + 2x_2 + x_3 &= 3 & (1) \\ x_1 + x_2 &= 3 & (2)^* \\ 0 &= 12 & (3)^* + 6 \times (2)^* \end{aligned}$$

System doesn't have solution because $0 \neq 12$ (it means that there are no x_1, x_2, x_3 which yield $0=12$).

Answer: no solution.