Answer on Question #46677 – Math – Algorithms | Quantitative Methods

Solve the system of equations

7 3x + 2y + 4z =

7 2x + y + z =

2 x + 3y + 5z =

using Gauss elimination with pivoting. Store the multipliers and also write the pivoting vector.

Solution.

$$\begin{cases} 3x + 2y + 4z = 7 \\ 2x + y + z = 7 \\ x + 3y + 5z = 2 \end{cases}$$

- **Swap Row 1 and Row 3.After this step we have:**

$$\begin{cases} x + 3y + 5z = 2 \\ 2x + y + z = 7 \\ 3x + 2y + 4z = 7 \end{cases}$$

- **Multiply the first equation by −2 and add the result to the second equation. The result is:**

$$\begin{cases} x + 3y + 5z = 2 \\ -5y - 9z = 3 \\ 3x + 2y + 4z = 7 \end{cases}$$

- **Multiply the first equation by −3 and add the result to the third equation. The result is:**

$$\begin{cases} x + 3y + 5z = 2 \\ -5y - 9z = 3 \\ -7 - 11z = 1 \end{cases}$$

- **Multiply the second equation by $-\frac{7}{5}$ and add the result to the third equation. The result is:**

$$\begin{cases} x+3y+5z=2 \\ -5y-9z=3 \\ \frac{8}{5}z=-\frac{16}{5} \end{cases}$$

- **Solve for z.**

  $z=-2$
- **Solve for y.**

  $-5y-9z=3 \rightarrow \ y=3$

- **solve for x by substituting y=3 and z=−2 into the first equation.**

  $x+3y+5z=2 \rightarrow \ x=3.$

  $Finally, \ x=3, \quad y=3, \quad z=-2.$