

Name of Student

Instructor's Name

Course Code

Date

Algebra - Linear Systems (UoL Worldwide style)

Augmented Matrix

$$\begin{bmatrix} 2 & 1 & -1 & 1 \\ -1 & 3 & 2 & 12 \\ 3 & -2 & 4 & 5 \end{bmatrix}$$

Eliminate the first column below the pivot (2):

- $R_2 \leftarrow R_2 + \frac{1}{2}R_1 \Rightarrow (0, 3.5, 1.5 \mid 12.5)$
- $R_3 \leftarrow R_3 - \frac{3}{2}R_1 \Rightarrow (0, -3.5, 5.5 \mid 3.5)$

Normalize R_2 by 3.5:

$$R_2 \rightarrow (0, 1, \frac{3}{7} \mid \frac{25}{7}).$$

Eliminate the y-term in R_3 :

$$R_3 \leftarrow R_3 + 3.5 R_2 \Rightarrow (0, 0, 7 \mid 16).$$

Back-substitute:

- From R_3 : $z = \frac{16}{7}$.
- From R_2 : $y + \frac{3}{7}z = \frac{25}{7} \Rightarrow y = \frac{25}{7} - \frac{48}{49} = \frac{127}{49}$.
- From R_1 : $2x + y - z = 1 \Rightarrow 2x = 1 - \frac{127}{49} + \frac{16}{7} = \frac{34}{49} \Rightarrow x = \frac{17}{49}$.

Solution (exact):

$x = \frac{17}{49}, y = \frac{127}{49}, z = \frac{16}{7}$

Quick check (second equation):

$$-x + 3y + 2z = -\frac{17}{49} + \frac{381}{49} + \frac{224}{49} = \frac{588}{49} = 12$$