LAB 1 ENGR 231

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(1) $2x - 3y + z = 3$

$x + 2y - z = 1$

$x + 4y + 2z = 2$

a) $\begin{bmatrix} 2 & -3 & 1 \\ 1 & 2 & -1 \\ 1 & 4 & 2 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 3 \\ 1 \\ 2 \end{bmatrix}$

b) $\left[\begin{array}{ccc|c} 2 & -3 & 1 & 3 \\ 1 & 2 & -1 & 1 \\ 1 & 4 & 2 & 2 \end{array}\right]$

c) $R3 - R2 \Rightarrow R3 \rightarrow \begin{bmatrix} 2 & -3 & 1 & 3 \\ 1 & 2 & -1 & 1 \\ 0 & 2 & 3 & 1 \end{bmatrix}$

$R1 - 2R2 \Rightarrow R2 \rightarrow \begin{bmatrix} 2 & -3 & 1 & 3 \\ 0 & -7 & 3 & 1 \\ 0 & 2 & 3 & 1 \end{bmatrix}$

$2R_2 + 7R3 \Rightarrow R3/4 \rightarrow \begin{bmatrix} 2 & -3 & 1 & 3 \\ 0 & -7 & 3 & 1 \\ 0 & 0 & 31 & \end{bmatrix}$

$R2 - R3 \Rightarrow R2/7 \rightarrow \begin{bmatrix} 2 & -3 & 1 & 3 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 31 & \end{bmatrix}$

$R1 + 3R2 \Rightarrow R1 \rightarrow \begin{bmatrix} 2 & 0 & 1 & 3 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 31 & \end{bmatrix}$

$3R1 - R3 \Rightarrow R1 \rightarrow \begin{bmatrix} 1 & 0 & 0 & 4/3 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 1/3 \end{bmatrix}$

$R1/6$

$R3/3$

d) it is consistent & unique

$x = 4/3$

$y = 0$

$z = 1/3$

$x+y+z=4$

$x-2y+3z=2$

$2x+2y+2z=1$

② a) $\begin{bmatrix}1&1&1\\1&-2&3\\2&2&2\end{bmatrix}\begin{bmatrix}x\\y\\z\end{bmatrix}=\begin{bmatrix}4\\2\\1\end{bmatrix}$ b) $\left[\begin{array}{ccc|c}1&1&1&4\\1&-2&3&2\\2&2&2&1\end{array}\right]$

c)

$R3-2R1\Rightarrow R3$ $\left[\begin{array}{ccc|c}1&1&1&4\\1&-2&3&2\\0&0&0&-7\end{array}\right]$ $R1-R2\Rightarrow R2$ $\left[\begin{array}{ccc|c}1&1&1&4\\0&3&-2&2\\0&0&0&-7\end{array}\right]$

$3R1-R2\Rightarrow R1$ $\left[\begin{array}{ccc|c}3&0&5&10\\0&3&-2&2\\0&0&0&-7\end{array}\right]$ $R1/3$ $R2/3$ $R3/-7$

$\left[\begin{array}{ccc|c}1&0&5/3&10/3\\0&1&-2/3&2/3\\0&0&0&1\end{array}\right]$

3 3 3 12

0 3 -2 2

3 0 5 10

d)

Not consistent because there is a poison pivot!

No solution