

Lesson 11 | Lesson 10 | Lesson 9

Lesson 2 Section 1.2

1) $R_3 + -2(R_2) \rightarrow R_3$

only the third row has changed.

2) a) ~~not~~ reduced row echelon form b) row echelon form

- every column with a leading 1
has zeroes in every position above
and below its leading 1

$$\textcircled{2} \quad \left[\begin{array}{ccc|c} 1 & 0 & 1 & 0 \\ 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{array} \right] \quad \begin{matrix} 1 \\ 0 \\ 1 \end{matrix} \quad \begin{matrix} 0 \\ 1 \\ 0 \end{matrix} \quad \begin{matrix} 1 \\ 0 \\ 1 \end{matrix}$$

1) reduced row echelon form

$\begin{matrix} 1 \\ 0 \\ 1 \end{matrix}$

- the leading 1 in the third row
has 1's above it so not row echelon

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

3) $\left[\begin{array}{ccc|c} 1 & 0 & 2 & 1 \\ 0 & 1 & -1 & 2 \end{array} \right]$ let $z = t$
so $y = 2 + t$
 $x = 1 - 2t$

4) $\begin{array}{l} x - y - z = 2 \\ 2x + y + z = 1 \\ -x + 2y = 1 \end{array} \Rightarrow \begin{array}{l} x - y - z = 2 \\ 3y + 3z = -3 \\ y - z = 3 \end{array} \Rightarrow \begin{array}{l} y + z = -1 \\ y - z = 3 \end{array} \Rightarrow$

$$\begin{array}{l} x - y - z = 2 \\ y + z = -1 \\ -2z = 4 \end{array} \Rightarrow \begin{array}{l} x - y - z = 2 \\ y + z = -1 \\ z = -2 \end{array}$$

$$\boxed{\begin{array}{l} z = -2 \\ y = 1 \\ x = 1 \end{array}}$$

④ w/ Gaussian elimination:

$$\left[\begin{array}{cccc|c} 1 & -1 & -1 & 2 \\ 2 & 1 & 1 & 1 \\ -1 & 2 & 0 & 1 \end{array} \right] \rightarrow \left[\begin{array}{cccc|c} 1 & -1 & -1 & 2 \\ 0 & 3 & 3 & -3 \\ 0 & 1 & -1 & 3 \end{array} \right] \rightarrow \left[\begin{array}{cccc|c} 1 & -1 & -1 & 2 \\ 0 & 1 & 1 & -1 \\ 0 & 1 & -1 & 3 \end{array} \right] \rightarrow \left[\begin{array}{cccc|c} 1 & -1 & -1 & 2 \\ 0 & 1 & 1 & -1 \\ 0 & 0 & 2 & 4 \end{array} \right]$$

$$\rightarrow \left[\begin{array}{cccc|c} 1 & -1 & -1 & 2 \\ 0 & 1 & 1 & -1 \\ 0 & 0 & 1 & -2 \end{array} \right] \quad \begin{matrix} x=1 \\ y=1 \\ z=-2 \end{matrix}$$

Show rowops did not change set

Lesson 2 Section 1.3

$$R_3 \rightarrow R_3 - 2(R_2) \quad | \quad \text{every column with a leading 1}$$

only the third row has changed
every reduced row echelon form has row echelon form

$$5) \begin{bmatrix} 2 & 2 & 1 & 0 \\ 2 & -3 & -4 & 0 \\ 4 & -1 & -3 & 0 \end{bmatrix} \rightarrow \begin{bmatrix} 2 & 2 & 1 & 0 \\ 0 & -5 & -5 & 0 \\ 0 & -5 & -5 & 0 \end{bmatrix} \rightarrow \begin{bmatrix} 2 & 2 & 1 & 0 \\ 0 & 1 & 1 & 0 \\ 0 & 1 & 1 & 0 \end{bmatrix} \rightarrow \begin{bmatrix} 1 & 1 & 0.5 & 0 \\ 0 & 1 & 1 & 0 \\ 0 & 1 & 1 & 0 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 0 & -0.5 & 0 \\ 0 & 1 & 1 & 0 \end{bmatrix} \xrightarrow{\text{let}} \begin{bmatrix} z = + \\ y = - \\ x = \frac{1}{2} + \end{bmatrix}$$

6) Gauss elimination

$$\begin{bmatrix} 1 & -1 & 1 & -1 \\ 2 & 1 & -3 & 4 \\ 2 & 0 & 2 & 2 \end{bmatrix} \rightarrow \begin{bmatrix} 1 & -1 & 1 & -1 \\ 0 & 3 & -5 & 6 \\ 0 & 2 & 0 & 4 \end{bmatrix} \rightarrow \begin{bmatrix} 1 & -1 & 1 & -1 \\ 0 & 1 & -5 & 2 \\ 0 & 2 & 0 & 4 \end{bmatrix} \rightarrow$$

$$\begin{bmatrix} 1 & -1 & 1 & -1 \\ 0 & 1 & -5 & 2 \\ 0 & 0 & 10 & 0 \end{bmatrix} \rightarrow \begin{bmatrix} 1 & -1 & 1 & -1 \\ 0 & 1 & -5 & 2 \\ 0 & 0 & 1 & 0 \end{bmatrix} \xrightarrow{\begin{array}{l} z=0 \\ y=2 \\ x=1 \end{array}}$$

$$\boxed{\begin{array}{l} z=0 \\ y=2 \\ x=1 \end{array}}$$