

$$\begin{bmatrix} 1 & 2 & 4 & 1 & -10 \\ 2 & 4 & 6 & 1 & -16 \\ 4 & 6 & 8 & 1 & -22 \end{bmatrix} \xrightarrow[\frac{R_3}{2}]{\frac{R_2}{2}} \begin{bmatrix} 1 & 2 & 4 & 1 & -10 \\ 1 & 2 & 3 & 1 & -8 \\ 2 & 3 & 4 & 1 & -11 \end{bmatrix} \begin{array}{l} R_1 - R_2 \\ = nR_2 \end{array}$$

$$\Rightarrow \begin{bmatrix} 1 & 2 & 4 & 1 & -10 \\ 0 & 0 & 1 & 1 & -2 \\ 2 & 3 & 4 & 1 & -11 \end{bmatrix} \xrightarrow[\frac{nR_1}{2}]{\begin{array}{l} R_3 \\ -R_1 \end{array}} \begin{bmatrix} 1 & 1 & 0 & 1 & -1 \\ 2 & 3 & 4 & 1 & -11 \\ 0 & 0 & 1 & 1 & -2 \end{bmatrix}$$

$$\begin{array}{l} 2R_1 \\ -R_2 \\ nR_2 \end{array} \Rightarrow \begin{bmatrix} 1 & 1 & 0 & -1 \\ 0 & -1 & -4 & 9 \\ 0 & 0 & 1 & -2 \end{bmatrix} \xrightarrow[\frac{nR_1}{nR_2}]{\begin{array}{l} R_1 \\ +R_2 \end{array}} \Rightarrow \begin{bmatrix} 1 & 0 & -4 & 8 \\ 0 & 1 & 4 & -9 \\ 0 & 0 & 1 & -2 \end{bmatrix}$$

$$\begin{array}{l} R_1 \\ +4R_3 \\ nR_1 \end{array} \Rightarrow \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 4 & -9 \\ 0 & 0 & 1 & -2 \end{bmatrix} \xrightarrow[\frac{nR_3}{nR_1}]{\begin{array}{l} R_2 \\ -4R_3 \end{array}} \Rightarrow \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & -1 \\ 0 & 0 & 1 & -2 \end{bmatrix}$$

$$\begin{bmatrix} 5 & -3 & 7 & 0 \\ 20 & 12 & 28 & 0 \\ 15 & -9 & 21 & 0 \end{bmatrix} \Rightarrow \begin{array}{l} R_2/4 \\ R_3/3 \end{array} \begin{bmatrix} 5 & -3 & 7 & 0 \\ 5 & 3 & 7 & 0 \\ 5 & -3 & 7 & 0 \end{bmatrix} \xrightarrow[\frac{nR_3}{-R_3}]{R_1} \begin{bmatrix} 5 & -3 & 7 & 0 \\ 5 & 3 & 7 & 0 \\ 0 & 0 & 0 & 0 \end{bmatrix}$$

$$\begin{array}{l} R_1 \\ -R_2 \\ nR_2 \end{array} \Rightarrow \begin{bmatrix} 5 & -3 & 7 & 0 \\ 0 & -6 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{bmatrix} \Rightarrow \begin{cases} x_1 = \frac{3}{5}x_2 - \frac{7}{5}x_3 \\ x_2 \text{ is free} \\ x_3 \text{ is free} \end{cases}$$

consistent, inf. of solutions

$$\begin{bmatrix} 1 & 0 & 6 & 0 & -2 \\ 0 & 1 & 7 & 0 & 9 \\ 0 & 0 & 0 & 1 & 9 \\ 0 & 0 & 0 & 0 & -7 \end{bmatrix} \begin{cases} x_1 = -6x_3 - 2 \\ x_2 = -7x_3 + 9 \\ x_3 \text{ is free} \\ x_4 = 9 \end{cases}$$


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$$\begin{bmatrix} 1 & 0 & -7 & 0 & -2 & 3 \\ 0 & 1 & 5 & -1 & 0 & 6 \\ 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$


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1/29/2020: Find an eq st the system is consistent

1.2

$$\begin{bmatrix} -1 & 6 & 7 & a \\ 0 & 18 & -20 & b \\ -4 & 6 & -8 & c \end{bmatrix}$$

$\therefore$  System is consistent when  $\underbrace{4a + b + c = 0}_P$

$$P \Leftrightarrow Q$$


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