A1

Monday, January 23, 2023 8:37 PM

We should not worry about
contradictions (?)

Is b a linear combination of a

$$\mathrm{rref}\left(\left[\begin{array}{cc|c} 1 & 5 & -1 \\ 3 & 10 & 4 \\ -2 & -4 & 2 \end{array}\right]\right) \sim \left[\begin{array}{cc|c} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{array}\right]$$

system is inconsistent and thus

3.) (8 pts) Solve the augmented matrix and express your solution in vector form.

$$\left[\begin{array}{ccccc|c} 2 & -4 & 3 & -4 & -11 & 28 \\ -1 & 2 & -1 & 2 & 5 & -13 \\ 0 & 0 & -3 & 1 & 6 & -10 \\ 3 & -6 & 10 & -8 & -28 & 61 \end{array}\right] \sim \left[\begin{array}{ccccc|c} 1 & -2 & 0 & 0 & 2 & 3 \\ 0 & 0 & 1 & 0 & -1 & 2 \\ 0 & 0 & 0 & 1 & 3 & -4 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{array}\right]$$

$x_1 = 3 + 2x_2 + 2x_5$

$x_2 = x_2$ (free)

$x_3 = 2 + x_5$

$x_4 = -4 - 3x_5$

$x_5 = x_5$ (free)

$$\Rightarrow \vec{x} = \begin{bmatrix} 3 \\ 0 \\ 2 \\ -4 \\ 0 \end{bmatrix} + x_2 \begin{bmatrix} 2 \\ 1 \\ 0 \\ 0 \\ 0 \end{bmatrix} + x_5 \begin{bmatrix} 2 \\ 0 \\ 1 \\ -3 \\ 1 \end{bmatrix}$$

Assessment 1 **Name**: ______________________________

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Math 220

No Calculator

1.) (8 pts) Solve the linear system

$$\begin{aligned} x_1 \quad\quad -3x_3 &= 8 \\ 2x_1+2x_2+9x_3 &= 7 \\ x_2+5x_3 &= -2 \end{aligned}$$

$$\Rightarrow \left[\begin{array}{ccc|c} 1 & 0 & -3 & 8 \\ 2 & 2 & 9 & 7 \\ 0 & 1 & 5 & -2 \end{array}\right] \quad R_2 - 2R_1 \to R_2$$

$$\sim \left[\begin{array}{ccc|c} 1 & 0 & -3 & 8 \\ 0 & 2 & 15 & -9 \\ 0 & 1 & 5 & -2 \end{array}\right] \quad R_2 \leftrightarrow R_3$$

$$\sim \left[\begin{array}{ccc|c} 1 & 0 & -3 & 8 \\ 0 & 1 & 5 & -2 \\ 0 & 2 & 15 & -9 \end{array}\right] \quad R_3 - 2R_2 \to R_3$$

$$\sim \left[\begin{array}{ccc|c} 1 & 0 & -3 & 8 \\ 0 & 1 & 5 & -2 \\ 0 & 0 & 5 & -5 \end{array}\right] \quad \tfrac{1}{5}R_3 \to R_3$$

$$\sim \left[\begin{array}{ccc|c} 1 & 0 & -3 & 8 \\ 0 & 1 & 5 & -2 \\ 0 & 0 & 1 & -1 \end{array}\right] \quad \begin{array}{l} R_1 + 3R_3 \to R_1 \\ R_2 - 5R_3 \to R_2 \end{array}$$

$$\sim \left[\begin{array}{ccc|c} 1 & 0 & 0 & 5 \\ 0 & 1 & 0 & 3 \\ 0 & 0 & 1 & -1 \end{array}\right] \Rightarrow \vec{x} = \begin{bmatrix} 5 \\ 3 \\ -1 \end{bmatrix}$$