M118
FALL 09

QUIZ 7

NAME _____

1) a) (15 PTS.) Row reduce the following augmented matrix:

$$\begin{pmatrix} 1 & 1 & 8 & 1 & 5 \\ 0 & 0 & 1 & 0 & 1 \\ 1 & 1 & 9 & 1 & 6 \end{pmatrix}$$

What is the last column of this row reduced matrix?

$$\begin{pmatrix} 1 & 1 & 8 & 1 & 5 \\ 0 & 0 & 1 & 0 & 1 \\ 1 & 1 & 9 & 1 & 6 \end{pmatrix} \xrightarrow{-R_1+R_3} \begin{pmatrix} 1 & 1 & 8 & 1 & 5 \\ 0 & 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 0 & 1 \end{pmatrix} \xrightarrow{-1R_2+R_3}$$

$$\begin{pmatrix} 1 & 1 & 8 & 1 & 5 \\ 0 & 0 & 1 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 \end{pmatrix} \xrightarrow{-8R_2+R_1} \begin{pmatrix} 1 & 1 & 0 & 1 & -3 \\ 0 & 0 & 1 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 \end{pmatrix} \longleftarrow \star$$

Answer: The <u>LAST</u> column is $\begin{pmatrix} -3 \\ 1 \\ 0 \end{pmatrix}$

b) (15 PTS.) Consider the following system of equations:

$$\begin{aligned} 1x_1 + 1x_2 + 8x_3 + 1x_4 &= 5 \\ 0x_1 + 0x_2 + 1x_3 + 0x_4 &= 1 \\ 1x_1 + 1x_2 + 9x_3 + 1x_4 &= 6 \end{aligned}$$

IF this system of equations is solved for x_1 in terms of the free variables for this system, and IF all of the free variables are given (i.e. set to) the value 5, then the value for x_1 is:

By $\star$ of part a) $\quad x_1 + x_2 + x_4 = -3 \Rightarrow x_1 = -3 - x_2 - x_4$

$\Rightarrow x_1 = -3 - 5 - 5 \quad (x_2 = x_4 = 5)$

$\Rightarrow x_1 = -13$

$x_1 =$ -13

SEE OTHER SIDE

2) (20 PTS.) Row reduce the following matrix:

$$\begin{pmatrix} 1 & 1 & 1 \\ 1 & 2 & 1 \\ 1 & 3 & 1 \\ 1 & 4 & 1 \end{pmatrix}$$

Four points off for each wrong entry below.

$$\xrightarrow{-R_3+R_4} \begin{pmatrix} 1 & 1 & 1 \\ 1 & 2 & 1 \\ 1 & 3 & 1 \\ 0 & 1 & 0 \end{pmatrix} \xrightarrow{-R_2+R_3} \begin{pmatrix} 1 & 1 & 1 \\ 1 & 2 & 1 \\ 0 & 1 & 0 \\ 0 & 1 & 0 \end{pmatrix} \xrightarrow{-R_1+R_2} \begin{pmatrix} 1 & 1 & 1 \\ 0 & 1 & 0 \\ 0 & 1 & 0 \\ 0 & 1 & 0 \end{pmatrix}$$

$$\xrightarrow{-R_2+R_3} \begin{pmatrix} 1 & 1 & 1 \\ 0 & 1 & 0 \\ 0 & 0 & 0 \\ 0 & 1 & 0 \end{pmatrix} \xrightarrow{-R_2+R_4} \begin{pmatrix} 1 & 1 & 1 \\ 0 & 1 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{pmatrix} \xrightarrow{-R_2+R_1} \begin{pmatrix} 1 & 0 & 1 \\ 0 & 1 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{pmatrix}$$

Answer (fill in the blanks):

$$\begin{pmatrix} 1 & 0 & 1 \\ 0 & 1 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{pmatrix}$$

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FALL 09

QUIZ 7

NAME _____

1) a) (15 PTS.) Row reduce the following augmented matrix:

$$\begin{pmatrix} 1 & 1 & 8 & 1 & 5 \\ 0 & 0 & 1 & 0 & 2 \\ 1 & 1 & 9 & 1 & 7 \end{pmatrix}$$

What is the last column of this row reduced matrix?

$$\begin{pmatrix} 1 & 1 & 8 & 1 & 5 \\ 0 & 0 & 1 & 0 & 2 \\ 1 & 1 & 9 & 1 & 7 \end{pmatrix} \xrightarrow{-R_1+R_2} \begin{pmatrix} 1 & 1 & 8 & 1 & 5 \\ 0 & 0 & 1 & 0 & 2 \\ 0 & 0 & 1 & 0 & 2 \end{pmatrix} \xrightarrow{-1R_2+R_3}$$

$$\begin{pmatrix} 1 & 1 & 8 & 1 & 5 \\ 0 & 0 & 1 & 0 & 2 \\ 0 & 0 & 0 & 0 & 0 \end{pmatrix} \xrightarrow{-8R_2+R_1} \begin{pmatrix} 1 & 1 & 0 & 1 & -11 \\ 0 & 0 & 1 & 0 & 2 \\ 0 & 0 & 0 & 0 & 0 \end{pmatrix} \leftarrow \star$$

LAST COLUMN

Answer: The <u>LAST</u> column is $\begin{pmatrix} -11 \\ 2 \\ 0 \end{pmatrix}$

b) (15 PTS.) Consider the following system of equations:

$$\begin{aligned} 1x_1 + 1x_2 + 8x_3 + 1x_4 &= 5 \\ 0x_1 + 0x_2 + 1x_3 + 0x_4 &= 2 \\ 1x_1 + 1x_2 + 9x_3 + 1x_4 &= 7 \end{aligned}$$

IF this system of equations is solved for x_1 in terms of the free variables for this system, and IF all of the free variables are given (i.e. set to) the value 5, then the value for x_1 is:

By $\star$ in part a), $x_1 + x_2 + x_3 = -11 \Rightarrow x_1 = -11 - x_2 - x_3$

$\Rightarrow x_1 = -11 - 5 - 5 \quad (x_2 = x_3 = 5)$

$\Rightarrow x_1 = -21$

$x_1 =$ -21

SEE OTHER SIDE

2) (20 PTS.) Row reduce the following matrix:

$$\begin{pmatrix} 1 & 2 & 1 \\ 1 & 3 & 1 \\ 1 & 4 & 1 \\ 1 & 5 & 1 \end{pmatrix}$$

Four points off for each wrong entry below.

$$\begin{pmatrix} 1 & 2 & 1 \\ 1 & 3 & 1 \\ 1 & 4 & 1 \\ 1 & 5 & 1 \end{pmatrix} \xrightarrow{-R_3+R_4} \begin{pmatrix} 1 & 2 & 1 \\ 1 & 3 & 1 \\ 1 & 4 & 1 \\ 0 & 1 & 0 \end{pmatrix} \xrightarrow{-R_2+R_3} \begin{pmatrix} 1 & 2 & 1 \\ 1 & 3 & 1 \\ 0 & 1 & 0 \\ 0 & 1 & 0 \end{pmatrix}$$

$$\xrightarrow{-R_1+R_2} \begin{pmatrix} 1 & 2 & 1 \\ 0 & 1 & 0 \\ 0 & 1 & 0 \\ 0 & 1 & 0 \end{pmatrix} \xrightarrow{-1R_2+R_3} \begin{pmatrix} 1 & 2 & 1 \\ 0 & 1 & 0 \\ 0 & 0 & 0 \\ 0 & 1 & 0 \end{pmatrix} \xrightarrow{-R_2+R_4} \begin{pmatrix} 1 & 2 & 1 \\ 0 & 1 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{pmatrix}$$

$$\xrightarrow{-2R_2+R_1} \begin{pmatrix} 1 & 0 & 1 \\ 0 & 1 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{pmatrix}$$

Answer (fill in the blanks):

$$\begin{pmatrix} 1 & 0 & 1 \\ 0 & 1 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{pmatrix}$$