Name:

J#:

Date:

Dr. Clontz

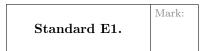**MASTERY QUIZ DAY 6**   Math 237 – Linear Algebra
Version 5   Fall 2017

Show all work. Answers without work will not receive credit. You may use a calculator, but you must show all relevant work to receive credit for a standard.

	Mark:
Standard E1.	

Write a system of linear equations corresponding to the following augmented matrix.

$$\begin{bmatrix} 3 & -1 & 0 & 1 & 5 \\ -1 & 9 & 1 & -7 & 0 \\ 1 & 0 & -1 & 0 & -3 \end{bmatrix}$$

Solution:

$$3x_1 - x_2 + x_4 = 5$$
$$-x_1 + 9x_2 + x_3 - 7x_4 = 0$$
$$x_1 - x_3 = -3$$

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	Mark:
Standard E3.	

Solve the system of equations

$$x + 3y - 4z = 5$$
$$3x + 9y + z = 2$$

Solution:

$$\text{RREF}\left(\begin{bmatrix} 1 & 3 & -4 & 5 \\ 3 & 9 & 1 & 2 \end{bmatrix}\right) = \begin{bmatrix} 1 & 3 & 0 & 1 \\ 0 & 0 & 1 & -1 \end{bmatrix}$$

So the solution set is

$$\left\{ \begin{bmatrix} 1 - 3c \\ c \\ -1 \end{bmatrix} \,\middle|\, c \in \mathbb{R} \right\}$$

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Find a basis for the solution set of the system of equations

$$
\begin{aligned}
x + 3y + 3z + 7w &= 0 \\
x + 3y - z - w &= 0 \\
2x + 6y + 3z + 8w &= 0 \\
x + 3y - 2z - 3w &= 0
\end{aligned}
$$

Solution:

$$
\mathrm{RREF}\left(\begin{bmatrix}
1 & 3 & 3 & 7 \\
1 & 3 & -1 & -1 \\
2 & 6 & 3 & 8 \\
1 & 3 & -2 & -3
\end{bmatrix}\right) = \begin{bmatrix}
1 & 3 & 0 & 1 \\
0 & 0 & 1 & 2 \\
0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0
\end{bmatrix}
$$

Then the solution set is

$$
\left\{ \begin{bmatrix} -3a - b \\ a \\ -2b \\ b \end{bmatrix} \mid a, b \in \mathbb{R} \right\}
$$

So a basis for the solution set is

$$
\left\{ \begin{bmatrix} 3 \\ -1 \\ 0 \\ 0 \end{bmatrix}, \begin{bmatrix} 1 \\ 0 \\ 2 \\ -1 \end{bmatrix} \right\}
$$

□