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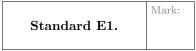
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## MASTERY QUIZ DAY 8

Math 237 – Linear Algebra Fall 2017

## Version 6

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.



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

$$\begin{bmatrix} 2 & -1 & 0 & 1 \\ -1 & 4 & 1 & -7 \\ 1 & 2 & -1 & 0 \end{bmatrix}$$

Solution:

$$2x_1 - x_2 = 1$$
$$-x_1 + 4x_2 + x_3 = -7$$
$$x_1 + 2x_2 - x_3 = 0$$

Standard E3.

Solve the system of equations

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

Solution:

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

So the solution set is

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

Standard E4.

Mark:

Find a basis for the solution set to the homogeneous system of equations given by

$$3x + 2y + z = 0$$
$$x + y + z = 0$$

**Solution:** Let  $A = \begin{bmatrix} 3 & 2 & 1 & 0 \\ 1 & 1 & 1 & 0 \end{bmatrix}$ , so RREF  $A = \begin{bmatrix} 1 & 0 & -1 & 0 \\ 0 & 1 & 2 & 0 \end{bmatrix}$ . It follows that the basis for the solution set is given by  $\left\{ \begin{bmatrix} 1 \\ -2 \\ 1 \end{bmatrix} \right\}$ .

Standard V1.

Let V be the set of all real numbers with the operations, for any  $x,y\in V,\,c\in\mathbb{R},$ 

$$x \oplus y = \sqrt{x^2 + y^2}$$
$$c \odot x = cx$$

Determine if V is a vector space or not.

**Solution:** This is not a vector space, as there is no zero vector.

Additional Notes/Marks