| Name: | |
|---|---|
| J#: | Dr. Clontz |
| Date: | |

**MASTERY QUIZ DAY 17** 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.

| **Standard V3.** | Mark: |
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Determine if the vectors $\begin{bmatrix}1\\1\\2\\1\end{bmatrix}$, $\begin{bmatrix}3\\3\\6\\3\end{bmatrix}$, $\begin{bmatrix}3\\-1\\3\\-2\end{bmatrix}$, and $\begin{bmatrix}7\\-1\\8\\-3\end{bmatrix}$ span $\mathbb{R}^4$.

**Solution:**

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

Since there are zero rows, they do not span. Alternatively, by inspection $\begin{bmatrix}3\\3\\6\\3\end{bmatrix}=3\begin{bmatrix}1\\1\\2\\1\end{bmatrix}$, so the set is linearly dependent, so it spans a subspace of dimension at most 3, therefore it does not span $\mathbb{R}^4$.

□

| **Standard V4.** | Mark: |
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Let $W$ be the set of all polynomials of the form $ax^3+bx$. Determine if $W$ is a subspace of $\mathcal{P}^3$.

**Solution:** Yes because $s(a_1x^3+b_1x)+t(a_2x^3+b_2x)=(sa_1+ta_2)x^3+(sb_1+tb_2)x$ also belongs to $W$. Alternately, yes because $W$ is isomorphic to $\mathbb{R}^2$.

□

| **Standard S2.** | Mark: |
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Determine if the set $\left\{\begin{bmatrix}1\\1\\-1\end{bmatrix},\begin{bmatrix}3\\-1\\1\end{bmatrix},\begin{bmatrix}2\\0\\-2\end{bmatrix}\right\}$ is a basis of $\mathbb{R}^3$

**Solution:**

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

Since the resulting matrix is the identity matrix, it is a basis.

□

| **Additional Notes/Marks** | |
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