Name:
J#:
Date:

Dr. Clontz

MASTERY QUIZ DAY 25 Math 237 – Linear Algebra
Version 4 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 A3.	Mark:

Determine if each of the following linear transformations is injective (one-to-one) and/or surjective (onto).

(a) $S:\mathbb{R}^4\to\mathbb{R}^3$ where $S(\vec{e}_1)=\begin{bmatrix}2\\1\\0\end{bmatrix}$, $S(\vec{e}_2)=\begin{bmatrix}1\\2\\1\end{bmatrix}$, $S(\vec{e}_3)=\begin{bmatrix}0\\-1\\0\end{bmatrix}$, and $S(\vec{e}_4)=\begin{bmatrix}3\\2\\1\end{bmatrix}$,

(b) $T:\mathbb{R}^3\to\mathbb{R}^3$ where $T(\vec{e}_1)=\begin{bmatrix}2\\2\\1\end{bmatrix}$, $T(\vec{e}_2)=\begin{bmatrix}1\\0\\4\end{bmatrix}$, and $T(\vec{e}_3)=\begin{bmatrix}1\\2\\-3\end{bmatrix}$.

Standard A4.	Mark:

Let $T:\mathcal{P}^3\to\mathcal{P}^3$ be the linear transformation given by

$$T\left(ax^3+bx^2+cx+d\right)=(a+3b+3c+7d)x^3+(a+3b-c-d)x^2+(2a+6b+3c+8d)x+(a+3b-2c-3d)$$

Compute a basis for the kernel and a basis for the image of T.

Additional Notes/Marks	