Name:
J#:
Date:

Dr. Clontz

MASTERY QUIZ DAY 25 Math 237 – Linear Algebra
Version 1 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) $S:\mathbb{R}^2\to\mathbb{R}^4$ given by the standard matrix $\begin{bmatrix}2&1\\1&2\\0&1\\3&-3\end{bmatrix}$.

(b) $T:\mathbb{R}^4\to\mathbb{R}^3$ given by the standard matrix $\begin{bmatrix}2&3&-1&1\\-1&1&1&1\\4&7&-1&5\end{bmatrix}$

Standard A4.	Mark:

Let $T:\mathbb{R}^{2\times 3}\to\mathbb{R}^3$ be the linear map given by $T\left(\begin{bmatrix}a&b&c\\x&y&z\end{bmatrix}\right)=\begin{bmatrix}a+x\\b+y\\c+z\end{bmatrix}$. Compute a basis for the kernel and a basis for the image of T.

Additional Notes/Marks	

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Dr. Clontz

MASTERY QUIZ DAY 25 Math 237 – Linear Algebra
Version 2 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 $T:\mathbb{R}^3\to\mathbb{R}^3$ be the linear map given by $T\left(\begin{bmatrix}x\\y\\z\end{bmatrix}\right)=\begin{bmatrix}8x-3y-z\\y+3z\\-7x+3y+2z\end{bmatrix}$. Compute a basis for the kernel and a basis for the image of T.

Additional Notes/Marks	

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MASTERY QUIZ DAY 25 Math 237 – Linear Algebra
Version 3 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) $S:\mathbb{R}^2\to\mathbb{R}^4$ given by the standard matrix $\begin{bmatrix}2&1\\1&2\\0&1\\3&-3\end{bmatrix}$.

(b) $T:\mathbb{R}^4\to\mathbb{R}^3$ given by the standard matrix $\begin{bmatrix}2&3&-1&1\\-1&1&1&1\\4&11&-1&5\end{bmatrix}$

Standard A4.	Mark:

Let $T:\mathbb{R}^{2\times 2}\to\mathbb{R}^3$ be the linear map given by $T\left(\begin{bmatrix}a&b\\x&y\end{bmatrix}\right)=\begin{bmatrix}a+x\\0\\b+y\end{bmatrix}$. Compute a basis for the kernel and a basis for the image of T.

Additional Notes/Marks	

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	

Name:
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Dr. Clontz

MASTERY QUIZ DAY 25 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 A3.	Mark:

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

(a) $S:\mathbb{R}^2\to\mathbb{R}^4$ given by the standard matrix $\begin{bmatrix}2&1\\1&2\\0&1\\3&-3\end{bmatrix}$.

(b) $T:\mathbb{R}^4\to\mathbb{R}^3$ given by the standard matrix $\begin{bmatrix}2&3&-1&1\\-1&1&1&1\\4&11&-1&5\end{bmatrix}$

Standard A4.	Mark:

Let $T:\mathbb{R}^4\to\mathbb{R}^3$ be the linear map given by $T\left(\begin{bmatrix}x\\y\\z\\w\end{bmatrix}\right)=\begin{bmatrix}8x-3y-z+4w\\y+3z-4w\\-7x+3y+2z-5w\end{bmatrix}$. Compute a basis for the kernel and a basis for the image of T.

Additional Notes/Marks	

Name:
J#:
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Dr. Clontz

MASTERY QUIZ DAY 25 Math 237 – Linear Algebra
Version 6 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) $S:\mathbb{R}^2\to\mathbb{R}^2$ given by the standard matrix $\begin{bmatrix}0&1\\-1&0\end{bmatrix}$.

(b) $T:\mathbb{R}^4\to\mathbb{R}^3$ given by the standard matrix $\begin{bmatrix}2&3&-1&-2\\0&1&3&1\\2&1&-7&-4\end{bmatrix}$

Standard A4.	Mark:

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

$$T\left(\begin{bmatrix}x\\y\\z\end{bmatrix}\right)=\begin{bmatrix}-3x+y\\-8x+2y-z\\2y+3z\end{bmatrix}$$

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

Additional Notes/Marks	