Name:	
J#:	Dr. Clontz
Date:	

Math 237 – Linear Algebra Fall 2017

Version 1

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.

Determine if  $\begin{bmatrix} 0 \\ -1 \\ 6 \\ -7 \end{bmatrix}$  belongs to the span of the set  $\left\{ \begin{bmatrix} 2 \\ 0 \\ -1 \\ 5 \end{bmatrix}, \begin{bmatrix} 4 \\ -1 \\ 4 \\ 3 \end{bmatrix} \right\}$ .

Solution: Since

RREF 
$$\begin{pmatrix} \begin{bmatrix} 2 & 4 & 0 \\ 0 & -1 & -1 \\ -1 & 4 & 6 \\ 5 & 3 & -7 \end{bmatrix} \end{pmatrix} = \begin{bmatrix} 1 & 0 & -2 \\ 0 & 1 & 1 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

does not contain a contradiction,  $\begin{bmatrix} 0\\-1\\6\\-7 \end{bmatrix}$  is a linear combination of the three vectors.

Name:	
J#:	Dr. Clontz
Date:	

Math 237 – Linear Algebra Fall 2017

Version 2

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.

Determine if  $\begin{bmatrix} 4 \\ -1 \\ 6 \\ -7 \end{bmatrix}$  belongs to the span of the set  $\left\{ \begin{bmatrix} 2 \\ 0 \\ -1 \\ 5 \end{bmatrix}, \begin{bmatrix} 4 \\ -1 \\ 4 \\ 3 \end{bmatrix} \right\}.$ 

Solution: Since

RREF  $\begin{pmatrix} \begin{bmatrix} 2 & 4 & | & 4 \\ 0 & -1 & | & -1 \\ -1 & 4 & | & 6 \\ 5 & 3 & | & -7 \end{bmatrix} \end{pmatrix} = \begin{bmatrix} 1 & 0 & | & 0 \\ 0 & 1 & | & 0 \\ 0 & 0 & | & 1 \\ 0 & 0 & | & 0 \end{bmatrix}$ 

contains the contradiction 0 = 1,  $\begin{bmatrix} 4 \\ -1 \\ 6 \\ -7 \end{bmatrix}$  is not a linear combination of the three vectors.

Name:	
J#:	Dr. Clontz
Date:	

Math 237 – Linear Algebra Fall 2017

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 V	2.	Mark:					
Det	ermine if $\begin{bmatrix} 0 \\ -1 \\ 2 \\ 6 \end{bmatrix}$	can l	be writte	en as a linear combination of the vectors	$\begin{bmatrix} 3 \\ -1 \\ -1 \\ 0 \end{bmatrix}$	and	$\begin{bmatrix} -1\\0\\1\\2 \end{bmatrix}$	

Solution:

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

Since this system has a solution,  $\begin{bmatrix} 0 \\ -1 \\ 2 \\ 6 \end{bmatrix}$  can be written as a linear combination of the vectors  $\begin{bmatrix} 3 \\ -1 \\ -1 \\ 0 \end{bmatrix}$  and

$$\begin{bmatrix} -1\\0\\1\\2 \end{bmatrix}, \text{ namely }$$

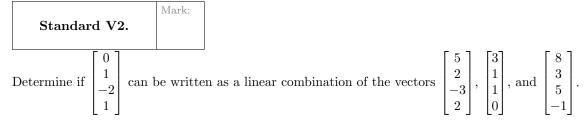
$$\begin{bmatrix} 0\\-1\\2\\6 \end{bmatrix} = \begin{bmatrix} 3\\-1\\-1\\0 \end{bmatrix} + 3 \begin{bmatrix} -1\\0\\1\\2 \end{bmatrix}.$$

Name:	
J#:	Dr. Clontz
Date:	

Math 237 – Linear Algebra Fall 2017

Version 4

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.



Solution:

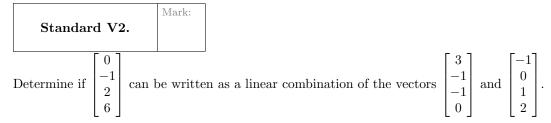
$$\text{RREF} \left( \begin{bmatrix} 8 & 5 & 3 & 0 \\ 3 & 2 & 1 & 1 \\ 5 & -3 & 1 & -2 \\ -1 & 2 & 0 & 1 \end{bmatrix} \right) = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

 $\text{RREF} \left( \begin{bmatrix} 8 & 5 & 3 & | & 0 \\ 3 & 2 & 1 & | & 1 \\ 5 & -3 & 1 & | & -2 \\ -1 & 2 & 0 & | & 1 \end{bmatrix} \right) = \begin{bmatrix} 1 & 0 & 0 & | & 0 \\ 0 & 1 & 0 & | & 0 \\ 0 & 0 & 1 & | & 0 \\ 0 & 0 & 0 & | & 1 \end{bmatrix}$  The system has no solution, so  $\begin{bmatrix} 0 \\ 1 \\ -2 \\ 1 \end{bmatrix}$  is not a linear combination of the three other vectors.

Name:	
J#:	Dr. Clontz
Date:	

Math 237 – Linear Algebra Fall 2017

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.



Solution:

$$\operatorname{RREF}\left(\left[\begin{array}{ccc|c}
3 & -1 & 0 \\
-1 & 0 & -1 \\
-1 & 1 & 2 \\
0 & 2 & 6
\end{array}\right]\right) = \left[\begin{array}{ccc|c}
1 & 0 & 1 \\
0 & 1 & 3 \\
0 & 0 & 0 \\
0 & 0 & 0
\end{array}\right]$$

Since this system has a solution,  $\begin{bmatrix} 0 \\ -1 \\ 2 \\ 6 \end{bmatrix}$  can be written as a linear combination of the vectors  $\begin{bmatrix} 3 \\ -1 \\ -1 \\ 0 \end{bmatrix}$  and

$$\begin{bmatrix} -1\\0\\1\\2 \end{bmatrix}, \text{ namely }$$

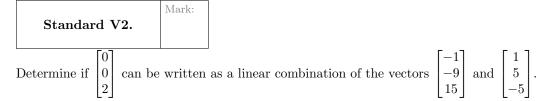
$$\begin{bmatrix} 0 \\ -1 \\ 2 \\ 6 \end{bmatrix} = \begin{bmatrix} 3 \\ -1 \\ -1 \\ 0 \end{bmatrix} + 3 \begin{bmatrix} -1 \\ 0 \\ 1 \\ 2 \end{bmatrix}.$$

Name:	
J#:	Dr. Clontz
Date:	

Math 237 – Linear Algebra

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.



Solution:

Version 6

RREF 
$$\begin{pmatrix} \begin{bmatrix} -1 & 1 & 0 \\ -9 & 5 & 0 \\ 15 & -5 & 2 \end{bmatrix} \end{pmatrix} = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

Since this system has no solution,  $\begin{bmatrix} 0 \\ 0 \\ 2 \end{bmatrix}$  cannot be written as a linear combination of the vectors  $\begin{bmatrix} -1 \\ -9 \\ 15 \end{bmatrix}$  and  $\begin{bmatrix} 1 \\ 5 \\ -5 \end{bmatrix}$ .