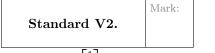
Name:	
J#:	Dr. Clontz
Date:	

## MASTERY QUIZ DAY 15

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  $\begin{bmatrix} 1\\4\\3 \end{bmatrix}$  is a linear combination of the vectors  $\begin{bmatrix} 3\\0\\-1 \end{bmatrix}$ ,  $\begin{bmatrix} 1\\-1\\4 \end{bmatrix}$ , and  $\begin{bmatrix} 5\\1\\-6 \end{bmatrix}$ .

Solution:

RREF 
$$\left( \begin{bmatrix} 3 & 1 & 5 & 1 \\ 0 & -1 & 1 & 4 \\ -1 & 4 & -6 & 3 \end{bmatrix} \right) = \begin{bmatrix} 1 & 0 & 2 & 0 \\ 0 & 1 & -1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

So  $\begin{bmatrix} 1\\4\\3 \end{bmatrix}$  is not a linear combination of the three vectors.

Standard S1.

Determine if the set of vectors  $\left\{ \begin{bmatrix} 1\\0\\1 \end{bmatrix}, \begin{bmatrix} 1\\2\\-1 \end{bmatrix}, \begin{bmatrix} 1\\3\\-2 \end{bmatrix} \right\}$  is linearly dependent or linearly independent

Solution:

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

Since there is a nonpivot column, the set is linearly dependent.

Standard S3.

Let W be the subspace of  $\mathcal{P}_2$  given by  $W = \text{span}\left(\left\{-3x^2 - 8x, x^2 + 2x + 2, -x + 3\right\}\right)$ . Find a basis for W.

Solution: Let 
$$A = \begin{bmatrix} -3 & 1 & 0 \\ -8 & 2 & -1 \\ 0 & 2 & 3 \end{bmatrix}$$
, and compute  $\text{RREF}(A) = \begin{bmatrix} 1 & 0 & \frac{1}{2} \\ 0 & 1 & \frac{3}{2} \\ 0 & 0 & 0 \end{bmatrix}$ . Since the first two columns are pivot columns,  $\left\{ -3x^2 - 8x, x^2 + 2x + 2 \right\}$  is a basis for  $W$ .

Let  $W = \operatorname{span}\left(\left\{\begin{bmatrix}1\\1\\2\\1\end{bmatrix},\begin{bmatrix}3\\3\\6\\3\end{bmatrix},\begin{bmatrix}3\\-1\\3\\-2\end{bmatrix},\begin{bmatrix}7\\-1\\8\\-3\end{bmatrix}\right\}\right)$ . Find the dimension of W.

Solution:

$$RREF \begin{pmatrix} \begin{bmatrix} 1 & 3 & 3 & 7 \\ 1 & 3 & -1 & -1 \\ 2 & 6 & 3 & 8 \\ 1 & 3 & -2 & -3 \end{bmatrix} \end{pmatrix} = \begin{bmatrix} 1 & 3 & 0 & 1 \\ 0 & 0 & 1 & 2 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{bmatrix}$$

This has two pivot columns, so W has dimension 2.

Additional Notes/Marks