Linear Algebra QUIZ: Closure/span/LI&LD
VERSION #1

Key
(PRINT your NAME) ______ (row #)

On the line provided PRINT the appropriate response TRUE/FALSE.

(5)

TRUE 1. If $\mathbf{S} = \{\mathbf{v}_1, \mathbf{v}_2, \mathbf{v}_3\}$ is a set of vectors in R^4, then span(S) is a closed set.

TRUE 2. If T is a linearly dependent set, then one of its vectors is a linear combination of the other vectors in the set.

FALSE 3. If **A** is a 5 by 5 singular matrix, then its columns must be a linearly independent set of vectors in R^5.

FALSE 4. Let W be a set containing infinitely many different vectors of R^3. Then W is a closed set.

TRUE 5. The cross product of **u** = [-2 3 4] and **v** = [5 1 -1] is **w** = [-7 18 -17].

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(5)

5. Is $\mathbf{v} = \begin{bmatrix}1\\2\\1\end{bmatrix}$ in span$\left\{\begin{bmatrix}0\\1\\1\end{bmatrix}, \begin{bmatrix}0\\-2\\1\end{bmatrix}\right\}$? SHOW YOUR WORK; give reason for the answer you circle.

YES NO

$$\text{rref}\left[\begin{array}{cc|c}0&0&1\\1&-2&2\\1&1&1\end{array}\right] \to \left[\begin{array}{cc|c}1&0&0\\0&1&0\\0&0&1\end{array}\right]$$

System is inconsistent

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(5)

6. Let $\mathbf{S} = \{(1,1,2),(2,1,0),(3,2,2)\}$. Determine if **S** linearly independent. SHOW YOUR WORK and give a reason for the answer you circle.

YES NO

$$\text{rref}\left[\begin{array}{ccc|c}1&2&3&0\\1&1&2&0\\2&0&2&0\end{array}\right] \to \left[\begin{array}{ccc|c}1&0&1&0\\0&1&1&0\\0&0&0&0\end{array}\right]$$

So there is an arbitrary constant

(5)

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7. Let S be the set of all 2 × 2 matrices of the form $\begin{bmatrix}a&b\\c&b\end{bmatrix}$ where a, b, c are any real numbers. Give a linearly independent spanning set for S using only zeros and ones for entries of the matrices.

$$\begin{bmatrix}1&0\\0&0\end{bmatrix} \quad \begin{bmatrix}0&1\\0&1\end{bmatrix} \quad \begin{bmatrix}0&0\\1&0\end{bmatrix}$$

Linear Algebra QUIZ: Closure/span/LI&LD　　Key
VERSION #2　　(PRINT your NAME)　　(row #)

On the line provided PRINT the appropriate response TRUE/FALSE.

FALSE 1. The cross product of **u** = [-2 3 4] and **v** = [5 0 -1] is **w** = [-7 18 -17].　Ans [-3 18 -15]

FALSE 2. If T is a linearly independent set, then one of its vectors is a linear combination of the other vectors in the set.

TRUE 3. If **A** is a 3 by 3 nonsingular matrix, then its rows must be a linearly independent set of vectors in R^3.

TRUE 4. If **S** = $\{\mathbf{v}_1, \mathbf{v}_2, \mathbf{v}_3\}$ is a set of vectors in R^6, then span(S) is a closed set.

FALSE 5. Let W be a set containing infinitely many different vectors of R^3. Then W is a closed set.

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5. Is $\mathbf{v} = \begin{bmatrix}5\\0\\1\end{bmatrix}$ in span$\left\{\begin{bmatrix}1\\0\\1\end{bmatrix}, \begin{bmatrix}2\\0\\1\end{bmatrix}\right\}$? SHOW YOUR WORK; give reason for the answer you circle.

$$\text{rref}\begin{bmatrix}1 & 2 & 5\\0 & 0 & 0\\1 & 1 & 1\end{bmatrix} \to \begin{bmatrix}1 & 0 & -3\\0 & 1 & 4\\0 & 0 & 0\end{bmatrix}$$

So system is consistent

YES　NO

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6. Let $\mathbf{S} = \{(1, 1, 2), (2, 1, 0), (-4, -1, 4)\}$. Determine if **S** linearly independent. SHOW YOUR WORK and give a reason for your conclusion.

$$\text{rref}\begin{bmatrix}1 & 2 & -4 & 0\\1 & 1 & -1 & 0\\2 & 0 & 4 & 0\end{bmatrix} \to \begin{bmatrix}1 & 0 & 2 & 0\\0 & 1 & -3 & 0\\0 & 0 & 0 & 0\end{bmatrix}$$

So there is an arbitrary constant

YES　NO

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7. Let **S** be the set of all 2 × 3 matrices of the form $\begin{bmatrix}a & b & b\\c & a & c\end{bmatrix}$ where a, b, c are any real numbers.

Give a linearly independent spanning set for **S** using only zeros and ones for entries of the matrices.

$$\begin{bmatrix}1 & 0 & 0\\0 & 1 & 0\end{bmatrix} \quad \begin{bmatrix}0 & 1 & 1\\0 & 0 & 0\end{bmatrix} \quad \begin{bmatrix}0 & 0 & 0\\1 & 0 & 1\end{bmatrix}$$