allowed 15 min
First left at 7 min
med = 10 min
last 15 min

MATH 332
Quiz IV
October 13, 1993

Name ______________________

(5) 1. Complete the Definition: The set of vectors $v_1, v_2, \ldots, v_n$ is said to be linearly independent if and only if the only sol to $a_1\bar{v}_1 + \cdots + a_r\bar{v}_r = 0$ is $a_1 = 0, a_2 = 0, \ldots, a_r = 0$. 8

(12) 2.

$$v_1 = \begin{bmatrix} 2 \\ -8 \\ 2 \end{bmatrix}, \quad v_2 = \begin{bmatrix} 2 \\ -7 \\ 5 \end{bmatrix}, \quad v_3 = \begin{bmatrix} 0 \\ 3 \\ 11 \end{bmatrix}, \quad v_4 = \begin{bmatrix} 0 \\ 3 \\ 9 \end{bmatrix}$$

a. Are vectors v_1, v_2, v_3 linearly independent?

$$a_1 \begin{bmatrix} 2 & 2 & 0 \\ -8 & -7 & 3 \\ 2 & 5 & 11 \end{bmatrix} \begin{bmatrix} a_1 \\ a_2 \\ a_3 \end{bmatrix} \to \begin{bmatrix} 2 & 2 & 0 \\ 0 & 1 & 3 \\ 0 & 3 & 11 \end{bmatrix} \to \begin{bmatrix} 2 & 2 & 0 \\ 0 & 1 & 3 \\ 0 & 0 & 2 \end{bmatrix}$$ 14

yes

b. Are vectors v_1, v_2, v_4 linearly independent? 15

$$\begin{bmatrix} 2 & 2 & 0 \\ -8 & -7 & 3 \\ 2 & 5 & 9 \end{bmatrix} \to \begin{bmatrix} 2 & 2 & 0 \\ 0 & 1 & 3 \\ 0 & 3 & 9 \end{bmatrix} \to \begin{bmatrix} 2 & 2 & 0 \\ 0 & 1 & 3 \\ 0 & 0 & 0 \end{bmatrix}$$

NO

(5) 3. Is the vector $\begin{bmatrix} -3 \\ 2 \end{bmatrix}$ in the null space of the matrix $\begin{bmatrix} 2 & 3 \\ -2 & 5 \end{bmatrix}$?

$$\begin{bmatrix} 2 & 3 \\ -2 & 5 \end{bmatrix} \begin{bmatrix} -3 \\ 2 \end{bmatrix} = \begin{bmatrix} 0 \\ 16 \end{bmatrix} \neq \begin{bmatrix} 0 \\ 0 \end{bmatrix} \quad \text{NO}$$ 13

after 5 min

(8) 4. a. Find a basis for the subspace spanned by the vectors (2,2,0), (-8,-7,3) and (2,5,9).

b. (2) This is a subspace of R^3 ? (R something!)

(A) $$\begin{bmatrix} 2 & 2 & 0 \\ -8 & -7 & 3 \\ 2 & 5 & 9 \end{bmatrix} \to \begin{bmatrix} 2 & 2 & 0 \\ 0 & 1 & 3 \\ 0 & 3 & 9 \end{bmatrix} \to \begin{bmatrix} 2 & 2 & 0 \\ 0 & 1 & 3 \\ 0 & 0 & 0 \end{bmatrix}$$ 13

(2, 2, 0) and (0, 1, 3)

(B) $$\begin{bmatrix} 2 & -8 & 2 \\ 2 & -7 & 5 \\ 0 & 3 & 9 \end{bmatrix} \to \begin{bmatrix} 2 & -8 & 2 \\ 0 & 1 & 3 \\ 0 & 3 & 9 \end{bmatrix} \to \begin{bmatrix} 2 & -8 & 2 \\ 0 & 1 & 3 \\ 0 & 0 & 0 \end{bmatrix}$$

$a_3 = 1 \quad a_2 = -3 \quad a_1 + 24 + 2 = 0$

$a_1 = -26$

(2, 2, 0) (-8, -7, 3)