Name _____ Quiz 4

1) Determine whether or not the vectors below are linearly independent. If they are not linearly independent, find a largest subset of vectors that is linearly independent. Justify your answer.

$$\begin{bmatrix} 3 \\ -1 \\ 2 \end{bmatrix}, \begin{bmatrix} 0 \\ 4 \\ 1 \end{bmatrix}, \begin{bmatrix} 2 \\ 4 \\ 7 \end{bmatrix}$$

$$\begin{bmatrix} 3 & 0 & 2 \\ -1 & 4 & 4 \\ 2 & 1 & 7 \end{bmatrix} \sim \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

The vectors are linearly independent, as seen from the fact that the corresponding matrix when row reduced has a pivot in each of their columns.

2) Determine whether or not the vectors below are linearly independent. If they are not linearly independent, find a largest subset of vectors that is linearly independent. Justify your answer.

$$\begin{bmatrix} 4 \\ -2 \\ 5 \\ -5 \end{bmatrix}, \begin{bmatrix} 3 \\ 0 \\ 5 \\ -4 \end{bmatrix}, \begin{bmatrix} -1 \\ 2 \\ 0 \\ 1 \end{bmatrix}, \begin{bmatrix} 1 \\ 8 \\ 3 \\ 3 \end{bmatrix}$$

$$\begin{bmatrix} 4 & 3 & -1 & 1 \\ -2 & 0 & 2 & 8 \\ 5 & 5 & 0 & 3 \\ -5 & -4 & 1 & 3 \end{bmatrix} \sim \begin{bmatrix} 1 & 0 & -1 & 0 \\ 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 \end{bmatrix}$$

The vectors are linearly dependent, as seen from the fact that the corresponding matrix when row reduced does not have a pivot in each of their columns. However, if we choose vectors 1, 2, and 4, we get a linearly independent collection:

$$\begin{bmatrix} 4 \\ -2 \\ 5 \\ -5 \end{bmatrix}, \begin{bmatrix} 3 \\ 0 \\ 5 \\ -4 \end{bmatrix}, \begin{bmatrix} 1 \\ 8 \\ 3 \\ 3 \end{bmatrix}$$