Name___Solutions____ Linear Algebra; Quiz 3

1) Find a matrix in reduced echelon form that is row-equivalent to $\begin{bmatrix} 2 & 6 & 0 \\ 3 & 9 & 17 \\ 0 & 14 & 28 \end{bmatrix}$

$$\begin{bmatrix} 2 & 6 & 0 \\ 3 & 9 & 17 \\ 0 & 14 & 28 \end{bmatrix} \sim \begin{bmatrix} 1 & 3 & 0 \\ 3 & 9 & 17 \\ 0 & 14 & 28 \end{bmatrix} \sim \begin{bmatrix} 1 & 3 & 0 \\ 0 & 0 & 17 \\ 0 & 14 & 28 \end{bmatrix} \sim \begin{bmatrix} 1 & 3 & 0 \\ 0 & 14 & 28 \\ 0 & 0 & 17 \end{bmatrix} \sim \begin{bmatrix} 1 & 3 & 0 \\ 0 & 1 & 2 \\ 0 & 0 & 17 \end{bmatrix} \sim \begin{bmatrix} 1 & 3 & 0 \\ 0 & 1 & 2 \\ 0 & 0 & 1 \end{bmatrix}$$

2) Are the vectors $\begin{bmatrix} 2 \\ 3 \\ 0 \end{bmatrix}$, $\begin{bmatrix} 6 \\ 9 \\ 14 \end{bmatrix}$, and $\begin{bmatrix} 0 \\ 17 \\ 28 \end{bmatrix}$ linearly independent or linearly dependent? No justification required.

Yes, as we see above that the columns of the matrix are linearly independent.

3) Consider your answer to part (1) as a linear transformation. Apply this transformation to the vector $\begin{bmatrix} 2 \\ 5 \\ 1 \end{bmatrix}$.

$$\begin{bmatrix} 1 & 3 & 0 \\ 0 & 1 & 2 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} 2 \\ 5 \\ 1 \end{bmatrix} = \begin{bmatrix} 1 \cdot 2 + 3 \cdot 5 \\ 1 \cdot 5 + 2 \cdot 1 \\ 1 \cdot 1 \end{bmatrix} = \begin{bmatrix} 17 \\ 7 \\ 1 \end{bmatrix}$$