Instructions: You must show all work to receive full credit for the problems below. You may check your work with a calculator, but answers without work will receive minimal credit. Use exact answers unless the problem starts with decimals or you are specifically asked to round.

1. Consider the matrix $A = \begin{bmatrix} 1 & -2 & 7 & 5 \\ 0 & 3 & 0 & 3 \\ 1 & 2 & 0 & 2 \\ 1 & 5 & -1 & 4 \end{bmatrix}$. Do the vectors represented by the columns of the matrix span R^4? Why or why not? If they do, choose a random vector and prove it is a linear combination of the other vectors in the matrix and the multiples of each vector needed to obtain it. If they do not span R^4, find one vector outside the span and show that the system is inconsistent.

2. Determine if each of the sets below are linearly independent. Explain your reasoning in each case.

   a. $\left\{ \begin{bmatrix} 1 \\ 3 \end{bmatrix}, \begin{bmatrix} -2 \\ 5 \end{bmatrix} \right\}$

   b. $\left\{ \begin{bmatrix} 1 \\ -2 \end{bmatrix}, \begin{bmatrix} 3 \\ 4 \end{bmatrix}, \begin{bmatrix} 7 \\ 1 \end{bmatrix} \right\}$

   c. $\left\{ \begin{bmatrix} 1 \\ 0 \\ 4 \end{bmatrix}, \begin{bmatrix} -1 \\ 5 \\ 1 \end{bmatrix} \right\}$

   d. $\left\{ \begin{bmatrix} 1 \\ 1 \\ -1 \end{bmatrix}, \begin{bmatrix} -2 \\ 2 \\ 3 \end{bmatrix}, \begin{bmatrix} 0 \\ 4 \\ 1 \end{bmatrix} \right\}$

   e. $\left\{ \begin{bmatrix} 1 \\ 3 \\ -1 \end{bmatrix}, \begin{bmatrix} -2 \\ 0 \\ 3 \end{bmatrix}, \begin{bmatrix} 1 \\ 2 \\ 1 \end{bmatrix}, \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} \right\}$