Name ____ Quiz 5

1) Given the basis B, below, for $\mathbb{R}^3$ and the vector $\vec{x}$, find a formula for $\vec{x}$ in that basis: $[\vec{x}]_B$

$$B = \left\{ \begin{bmatrix} 3 \\ -1 \\ 2 \end{bmatrix}, \begin{bmatrix} 0 \\ 4 \\ 1 \end{bmatrix}, \begin{bmatrix} 2 \\ 4 \\ 7 \end{bmatrix} \right\} \quad \vec{x} = \begin{bmatrix} 2 \\ 5 \\ 7 \end{bmatrix}$$

2) Given the bases, B_1 and B_2, below for $\mathbb{R}^3$ and the vector $\vec{x}$, find a formula for $\vec{x}$ in the basis B_2: $[\vec{x}]_{B_2}$

$$B_1 = \left\{ \begin{bmatrix} 3 \\ -1 \\ 2 \end{bmatrix}, \begin{bmatrix} 0 \\ 4 \\ 1 \end{bmatrix}, \begin{bmatrix} 2 \\ 4 \\ 7 \end{bmatrix} \right\} \quad B_2 = \left\{ \begin{bmatrix} 2 \\ 1 \\ 2 \end{bmatrix}, \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}, \begin{bmatrix} 0 \\ 7 \\ 0 \end{bmatrix} \right\} \quad \vec{x} = \begin{bmatrix} 2 \\ 5 \\ 7 \end{bmatrix}_{B_1}$$

3) Suppose the matrix A has size 5×13. That is, 5 rows and 13 columns. It is known that the equation $A\vec{x} = \vec{0}$ has multiple solutions, but that $A\vec{x} = [1 \quad 2 \quad 3 \quad 3 \quad 1]^T$ has no solutions. Find the *smallest* possible dimension the null space of A could have.