1. In *each* part below, let A be the matrix whose columns are formed by the given set S of vectors.
First, write the RREF form of A next to S.
Second, use RREF(A) to explain whether S spans $\mathbf{R}^3$.
Third, show how RREF(A) indicates if S is linearly independent.
Finally, circle Y or N as the correct answer to the question, is S a basis of $\mathbf{R}^3$.

1A. $S = \left\{ \begin{bmatrix} 2 \\ -1 \\ 3 \end{bmatrix}, \begin{bmatrix} 8 \\ -4 \\ 12 \end{bmatrix}, \begin{bmatrix} -3 \\ 1 \\ -1 \end{bmatrix}, \begin{bmatrix} -13 \\ 5 \\ -9 \end{bmatrix} \right\}$ RREF(A):

Span $\mathbf{R}^3$ discussion:

Linear Independence discussion:

Basis? Y N

1B. $S = \left\{ \begin{bmatrix} 3 \\ 2 \\ 3 \end{bmatrix}, \begin{bmatrix} 12 \\ 8 \\ 12 \end{bmatrix}, \begin{bmatrix} 15 \\ 9 \\ 7 \end{bmatrix}, \begin{bmatrix} 16 \\ 7 \\ -13 \end{bmatrix} \right\}$ RREF(A):

Span $\mathbf{R}^3$ discussion:

Linear Independence discussion:

Basis? Y N

quiz continues other side

1C. $S = \left\{ \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}, \begin{bmatrix} 4 \\ 5 \\ 6 \end{bmatrix}, \begin{bmatrix} 7 \\ 8 \\ 9 \end{bmatrix} \right\}$ RREF(A):

Span $\mathbf{R}^3$ discussion:

Linear Independence discussion:

Basis? Y N

1D. $S = \left\{ \begin{bmatrix} 0 \\ 1 \\ 1 \end{bmatrix}, \begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix}, \begin{bmatrix} 1 \\ 1 \\ 0 \end{bmatrix} \right\}$ RREF(A):

Span $\mathbf{R}^3$ discussion:

Linear Independence discussion:

Basis? Y N

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2. Let $D = \begin{bmatrix} 0 & -1 & -4 & -1 & 1 & 1 \\ 2 & 11 & 0 & 4 & -1 & 4 \\ -2 & -8 & 12 & 3 & 6 & 5 \\ 1 & 5 & -2 & 1 & -1 & 1 \end{bmatrix}$; then D is row equivalent to $\begin{bmatrix} 1 & 0 & -22 & 0 & 12 & 18 \\ 0 & 1 & 4 & 0 & -3 & -4 \\ 0 & 0 & 0 & 1 & 2 & 3 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$

2A. Find a basis for Null(D).

2B. Express the fifth column of D as a linear combination of the other columns or explain why this is impossible.