Linjär Algebra
Linjära kombinationer tillika linjära beroenden

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For problems 1-8, make sure that (if a linear combination exists) that the addition of the two vectors (multiplied by scalars) actually yields the resulting vector. Also graph all relevant vectors in an xy-coordinate system to make sure your answer makes sense.

1. Given vectors $\mathbf{A} = \begin{bmatrix} 2 & -1 \end{bmatrix}$, $\mathbf{B} = \begin{bmatrix} -3 & 4 \end{bmatrix}$, and $\mathbf{C} = \begin{bmatrix} 7 & -6 \end{bmatrix}$, determine if $\mathbf{C}$ is a linear combination of $\mathbf{A}$ and $\mathbf{B}$.

2. For vectors $\mathbf{D} = \begin{bmatrix} 4 & -2 \end{bmatrix}$, $\mathbf{E} = \begin{bmatrix} -1 & 3 \end{bmatrix}$, and $\mathbf{F} = \begin{bmatrix} 7 & -1 \end{bmatrix}$, verify if $\mathbf{F}$ is a linear combination of $\mathbf{D}$ and $\mathbf{E}$.

3. Given vectors $\mathbf{G} = \begin{bmatrix} 1 & 5 \end{bmatrix}$ and $\mathbf{H} = \begin{bmatrix} -2 & 3 \end{bmatrix}$, decide if $\mathbf{I} = \begin{bmatrix} 9 & 19 \end{bmatrix}$ is a linear combination of $\mathbf{G}$ and $\mathbf{H}$.

4. Determine whether the vector $\mathbf{J} = \begin{bmatrix} 3 & -4 \end{bmatrix}$ can be expressed as a linear combination of vectors $\mathbf{K} = \begin{bmatrix} -1 & 2 \end{bmatrix}$ and $\mathbf{L} = \begin{bmatrix} 3 & -6 \end{bmatrix}$.

5. Verify if the vector $\mathbf{M} = \begin{bmatrix} -2 & 1 \end{bmatrix}$ can be represented as a linear combination of vectors $\mathbf{N} = \begin{bmatrix} 3 & -5 \end{bmatrix}$ and $\mathbf{O} = \begin{bmatrix} -6 & 3 \end{bmatrix}$.

6. Check whether the vector $\mathbf{P} = \begin{bmatrix} 5 & 2 \end{bmatrix}$ is a linear combination of vectors $\mathbf{Q} = \begin{bmatrix} -1 & 1 \end{bmatrix}$ and $\mathbf{R} = \begin{bmatrix} 3 & -3 \end{bmatrix}$.

7. Determine if the vector $\mathbf{S} = \begin{bmatrix} -5 & 2 \end{bmatrix}$ can be expressed as a linear combination of vectors $\mathbf{T} = \begin{bmatrix} 1 & -4 \end{bmatrix}$ and $\mathbf{U} = \begin{bmatrix} -2 & 8 \end{bmatrix}$.

8. Verify whether the vector $\mathbf{V} = \begin{bmatrix} 2 & -3 \end{bmatrix}$ is a linear combination of vectors $\mathbf{W} = \begin{bmatrix} -4 & 1 \end{bmatrix}$ and $\mathbf{X} = \begin{bmatrix} 8 & -2 \end{bmatrix}$.

For problems 9-10, make sure that (if a linear combination exists) that the addition of the two vectors (multiplied by scalars) actually yields the resulting vector. You do not have to graph any vectors in an xyz-coordinate system, unless you want to.

9. Given vectors $\mathbf{A} = \begin{bmatrix} 1 & 0 & -2 \end{bmatrix}$ and $\mathbf{B} = \begin{bmatrix} 2 & -1 & 3 \end{bmatrix}$, determine if $\mathbf{C} = \begin{bmatrix} 4 & -1 & -1 \end{bmatrix}$ is a linear combination of $\mathbf{A}$ and $\mathbf{B}$.

10. For vectors $\mathbf{D} = \begin{bmatrix} 2 & 4 & -2 \end{bmatrix}$ and $\mathbf{E} = \begin{bmatrix} -1 & 3 & 2 \end{bmatrix}$, verify if $\mathbf{F} = \begin{bmatrix} 1 & 7 & 1 \end{bmatrix}$ is a linear combination of $\mathbf{D}$ and $\mathbf{E}$.