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 wether $\mathbf{f} = \begin{bmatrix} 1 \; 7 \; 1 \end{bmatrix}$ is a linear combination of said vectors.