Assignment WW-VectorSpace

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1. (1 point)

Let $\vec{u} = \begin{bmatrix} -4 & 0 & 4 \end{bmatrix}$ and $\vec{v} = \begin{bmatrix} 6 & -1 & 4 \end{bmatrix}$. Find the vector $\vec{w} = 4\vec{u} - 6\vec{v}$ and its additive inverse.

$\vec{w} = \begin{bmatrix} \_\_ & \_\_ & \_\_ \end{bmatrix}$

$-\vec{w} = \begin{bmatrix} \_\_ & \_\_ & \_\_ \end{bmatrix}$

Correct Answers:

- $\begin{bmatrix} -52 & 6 & -8 \end{bmatrix}$
- $\begin{bmatrix} 52 & -6 & 8 \end{bmatrix}$

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2. (1 point)

Let $\mathbf{u}_1 = \begin{bmatrix} 6 \\ -4 \end{bmatrix}$, and $\mathbf{u}_2 = \begin{bmatrix} 6 \\ -3 \end{bmatrix}$.

Select all of the vectors that are in the span of $\{\mathbf{u}_1, \mathbf{u}_2\}$. (Check every statement that is correct.)

- A. The vector $\begin{bmatrix} 6 \\ -4 \end{bmatrix}$ is in the span.
- B. The vector $\begin{bmatrix} 0 \\ 0 \end{bmatrix}$ is in the span.
- C. The vector $3\begin{bmatrix} 6 \\ -4 \end{bmatrix}$ is in the span.
- D. The vector $-6\begin{bmatrix} 6 \\ -3 \end{bmatrix} + 3\begin{bmatrix} 6 \\ -4 \end{bmatrix}$ is in the span.
- E. All vectors in $\mathbb{R}^2$ are in the span.
- F. The vector $\begin{bmatrix} 6 \\ -3 \end{bmatrix}$ is in the span.
- G. We cannot tell which vectors are in the span.

Solution:

SOLUTION

Any linear combination of the vectors is in the span. This always includes the zero vector and the original vectors. Since the two vectors are not on the same line through the origin, all vectors in $\mathbb{R}^2$ are in the span.

Correct Answers:

- `ABCDEF`

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3. (1 point) Let W be the set of all vectors of the form $\begin{bmatrix} 2a+2b \\ -a \\ b \end{bmatrix}$. Find vectors $\vec{u}$ and $\vec{v}$ in $\mathbb{R}^3$ such that $W = \text{span}\{\vec{u}, \vec{v}\}$.

$\vec{u} = \begin{bmatrix} \_\_ \\ \_\_ \\ \_\_ \end{bmatrix}, \vec{v} = \begin{bmatrix} \_\_ \\ \_\_ \\ \_\_ \end{bmatrix}$.

Correct Answers:

- `[[2],[-1],[0]],` $\begin{bmatrix} 2 \\ 0 \\ 1 \end{bmatrix}$

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4. (1 point) Let W be the set of all vectors of the form $\begin{bmatrix} -4s-t \\ 4t-4s \\ s-4t \end{bmatrix}$. Find vectors $\vec{u}$ and $\vec{v}$ in $\mathbb{R}^3$ such that $W = \text{span}\{\vec{u}, \vec{v}\}$.

$\vec{u} = \begin{bmatrix} \_\_ \\ \_\_ \\ \_\_ \end{bmatrix}, \vec{v} = \begin{bmatrix} \_\_ \\ \_\_ \\ \_\_ \end{bmatrix}$.

Correct Answers:

- `[[-4],[-4],[1]],` $\begin{bmatrix} -1 \\ 4 \\ -4 \end{bmatrix}$