Assignment WW-Bases

1. (1 point) Let W be the set of all vectors of the form $\begin{bmatrix} a+5b \\ -a \\ b \end{bmatrix}$. 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:

- `[[1],[-1],[0]],` $\begin{bmatrix} 5 \\ 0 \\ 1 \end{bmatrix}$

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2. (1 point) The vectors

$$\vec{v}_1 = \begin{bmatrix} 6 \\ -3 \\ 0 \end{bmatrix}, \quad \vec{v}_2 = \begin{bmatrix} -1 \\ 7 \\ -5 \end{bmatrix}, \quad \vec{v}_3 = \begin{bmatrix} 3 \\ 18 \\ k \end{bmatrix}$$

form a basis for $\mathbb{R}^3$ if and only if $k \neq$ ____.

Correct Answers:

- `-15`

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3. (1 point)

Let W_1 be the set: $\begin{bmatrix} 1 \\ -3 \\ 0 \end{bmatrix}, \begin{bmatrix} -2 \\ 9 \\ 0 \end{bmatrix}, \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix}, \begin{bmatrix} 0 \\ -3 \\ 5 \end{bmatrix}$.

Determine if W_1 is a basis for $\mathbb{R}^3$ and check the correct answer(s) below.

- A. W_1 is a basis.
- B. W_1 is not a basis because it is linearly dependent.
- C. W_1 is not a basis because it does not span $\mathbb{R}^3$.

Let W_2 be the set: $\begin{bmatrix} -2 \\ 3 \\ 0 \end{bmatrix}, \begin{bmatrix} 6 \\ -1 \\ 5 \end{bmatrix}$.

Determine if W_2 is a basis for $\mathbb{R}^3$ and check the correct answer(s) below.

- A. W_2 is not a basis because it is linearly dependent.
- B. W_2 is not a basis because it does not span $\mathbb{R}^3$.
- C. W_2 is a basis.

Correct Answers:

- `B`
- `B`

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4. (1 point)

The set

$$B = \left\{ \begin{bmatrix} -2 \\ -3 \end{bmatrix}, \begin{bmatrix} 4 \\ 11 \end{bmatrix} \right\}$$

is a basis for $\mathbb{R}^2$. Find the coordinates of the vector $\vec{x} = \begin{bmatrix} -14 \\ -31 \end{bmatrix}$ relative to the basis B.

$[\vec{x}]_B = \begin{bmatrix} \_\_ \\ \_\_ \end{bmatrix}$

Correct Answers:

- $\begin{bmatrix} 3 \\ -2 \end{bmatrix}$