Changing basis

Practice Quiz, 5 questions

5/5 points (100%)

Congratulations! You passed!

Next Item

1 / 1
points

1.
In this quiz, you will practice changing from the standard basis to a basis consisting of orthogonal vectors.

Given vectors $\mathbf{v} = \begin{bmatrix} 5 \\ -1 \end{bmatrix}$, $\mathbf{b_1} = \begin{bmatrix} 1 \\ 1 \end{bmatrix}$ and $\mathbf{b_2} = \begin{bmatrix} 1 \\ -1 \end{bmatrix}$ all written in the standard basis, what is $\mathbf{v}$ in the basis defined by $\mathbf{b_1}$ and $\mathbf{b_2}$? You are given that $\mathbf{b_1}$ and $\mathbf{b_2}$ are orthogonal to each other.

- $\mathbf{v_b} = \begin{bmatrix} 2 \\ 3 \end{bmatrix}$

Correct
The vector $\mathbf{v}$ is projected onto the two vectors $\mathbf{b_1}$ and $\mathbf{b_2}$.

- $\mathbf{v_b} = \begin{bmatrix} 3 \\ 2 \end{bmatrix}$
- $\mathbf{v_b} = \begin{bmatrix} -3 \\ 2 \end{bmatrix}$
- $\mathbf{v_b} = \begin{bmatrix} 3 \\ -2 \end{bmatrix}$

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1 / 1
points

2.

Given vectors $\mathbf{v} = \begin{bmatrix} 10 \\ -5 \end{bmatrix}$, $\mathbf{b_1} = \begin{bmatrix} 3 \\ 4 \end{bmatrix}$ and $\mathbf{b_2} = \begin{bmatrix} 4 \\ -3 \end{bmatrix}$ all written in the standard basis, what is $\mathbf{v}$ in the basis defined by $\mathbf{b_1}$ and $\mathbf{b_2}$? You are given that $\mathbf{b_1}$ and $\mathbf{b_2}$ are orthogonal to each other.

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- $\mathbf{v_b} = \begin{bmatrix} 11/5 \\ 2/5 \end{bmatrix}$
- $\mathbf{v_b} = \begin{bmatrix} 2/5 \\ 11/5 \end{bmatrix}$

Correct
The vector $\mathbf{v}$ is projected onto the two vectors $\mathbf{b_1}$ and $\mathbf{b_2}$.

- $\mathbf{v_b} = \begin{bmatrix} -2/5 \\ 11/5 \end{bmatrix}$
- $\mathbf{v_b} = \begin{bmatrix} 2 \\ 11 \end{bmatrix}$

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1 / 1
points

3.
Given vectors $\mathbf{v} = \begin{bmatrix} 2 \\ 2 \end{bmatrix}$, $\mathbf{b_1} = \begin{bmatrix} -3 \\ 1 \end{bmatrix}$ and $\mathbf{b_2} = \begin{bmatrix} 1 \\ 3 \end{bmatrix}$ all written in the standard basis, what is $\mathbf{v}$ in the basis defined by $\mathbf{b_1}$ and $\mathbf{b_2}$? You are given that $\mathbf{b_1}$ and $\mathbf{b_2}$ are orthogonal to each other.

- $\mathbf{v_b} = \begin{bmatrix} 5/4 \\ -5/2 \end{bmatrix}$
- $\mathbf{v_b} = \begin{bmatrix} -2/5 \\ 4/5 \end{bmatrix}$

Correct
The vector $\mathbf{v}$ is projected onto the two vectors $\mathbf{b_1}$ and $\mathbf{b_2}$.

- $\mathbf{v_b} = \begin{bmatrix} -2/5 \\ 5/4 \end{bmatrix}$
- $\mathbf{v_b} = \begin{bmatrix} 2/5 \\ -4/5 \end{bmatrix}$

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1 / 1

points

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4.

Given vectors $\mathbf{v} = \begin{bmatrix}1\\1\\1\end{bmatrix}$, $\mathbf{b_1} = \begin{bmatrix}2\\1\\0\end{bmatrix}$, $\mathbf{b_2} = \begin{bmatrix}1\\-2\\-1\end{bmatrix}$ and $\mathbf{b_3} = \begin{bmatrix}-1\\2\\-5\end{bmatrix}$ all written in the standard basis, what is $\mathbf{v}$ in the basis defined by $\mathbf{b_1}$, $\mathbf{b_2}$ and $\mathbf{b_3}$? You are given that $\mathbf{b_1}$, $\mathbf{b_2}$ and $\mathbf{b_3}$ are all pairwise orthogonal to each other.

- $\mathbf{v_b} = \begin{bmatrix}3/5\\-1/3\\-2/15\end{bmatrix}$

Correct

The vector $\mathbf{v}$ is projected onto the vectors $\mathbf{b_1}$, $\mathbf{b_2}$ and $\mathbf{b_3}$.

- $\mathbf{v_b} = \begin{bmatrix}3\\-1\\-2\end{bmatrix}$

- $\mathbf{v_b} = \begin{bmatrix}-3/5\\-1/3\\-2/15\end{bmatrix}$

- $\mathbf{v_b} = \begin{bmatrix}-3/5\\-1/3\\2/15\end{bmatrix}$

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1 / 1 points

5.

Given vectors $\mathbf{v} = \begin{bmatrix}1\\1\\2\\3\end{bmatrix}$, $\mathbf{b_1} = \begin{bmatrix}1\\0\\0\\0\end{bmatrix}$, $\mathbf{b_2} = \begin{bmatrix}0\\2\\-1\\0\end{bmatrix}$, $\mathbf{b_3} = \begin{bmatrix}0\\1\\2\\0\end{bmatrix}$ and

$\mathbf{b_4} = \begin{bmatrix}0\\0\\0\\3\end{bmatrix}$ all written in the standard basis, what is $\mathbf{v}$ in the basis defined by

$\mathbf{b_1}$, $\mathbf{b_2}$, $\mathbf{b_3}$ and $\mathbf{b_4}$? You are given that $\mathbf{b_1}$, $\mathbf{b_2}$, $\mathbf{b_3}$ and $\mathbf{b_4}$ are all pairwise orthogonal to each other.

- $\mathbf{v_b} = \begin{bmatrix}0\\1\\1\\1\end{bmatrix}$

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$$\mathbf{v_b} = \begin{bmatrix} 1 \\ 0 \\ 1 \\ 1 \end{bmatrix}$$

Correct

The vector $\mathbf{v}$ is projected onto the vectors $\mathbf{b_1}, \mathbf{b_2}, \mathbf{b_3}$ and $\mathbf{b_4}$.

$$\mathbf{v_b} = \begin{bmatrix} 1 \\ 1 \\ 0 \\ 1 \end{bmatrix}$$

$$\mathbf{v_b} = \begin{bmatrix} 1 \\ 1 \\ 1 \\ 0 \end{bmatrix}$$