Changing basis

Practice Quiz, 5 questions

5/5 points (100.00%)

Congratulations! You passed!

Next Item

1 / 1 point

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.

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

Correct

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

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

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.

1 / 1 point

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

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

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

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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.

1 / 1 point

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

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

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

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

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

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.

1 / 1 point

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

Correct

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

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

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

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

1 / 1 point

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.

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

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

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

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

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