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

1 / 1 point

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.

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

 **Correct**

The vector \mathbf{v} is projected onto the two vectors \mathbf{b}_1 and \mathbf{b}_2 .

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

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

 **Correct**

The vector \mathbf{v} is projected onto the two vectors \mathbf{b}_1 and \mathbf{b}_2 .

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

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

 **Correct**

The vector \mathbf{v} is projected onto the two vectors \mathbf{b}_1 and \mathbf{b}_2 .

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.

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

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

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

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

 **Correct**

The vector \mathbf{v} is projected onto the vectors \mathbf{b}_1 , \mathbf{b}_2 and \mathbf{b}_3 .

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.

$\mathbf{v}_b = \begin{bmatrix} 0 \\ 1 \\ 1 \\ 1 \end{bmatrix}$

$\mathbf{v}_b = \begin{bmatrix} 1 \\ 0 \\ 1 \\ 1 \end{bmatrix}$

$\mathbf{v}_b = \begin{bmatrix} 1 \\ 1 \\ 0 \\ 1 \end{bmatrix}$

$\mathbf{v}_b = \begin{bmatrix} 1 \\ 1 \\ 1 \\ 0 \end{bmatrix}$

 **Correct**

The vector \mathbf{v} is projected onto the vectors \mathbf{b}_1 , \mathbf{b}_2 , \mathbf{b}_3 and \mathbf{b}_4 .