✓ **Congratulations! You passed!**

TO PASS 80% or higher

Keep Learning

GRADE
100%

Changing basis

TOTAL POINTS 5

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.

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

✓ **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

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

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

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

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

✓ **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.

1 / 1 point

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

✓ **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

1 / 1 point

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 $\mathbf{b}_4$.