Problem 1. **(1 point)**

Consider the following three bases of $\mathbb{R}^3$:

(1) $\begin{bmatrix}1\\1\\0\end{bmatrix}, \begin{bmatrix}0\\1\\1\end{bmatrix}, \begin{bmatrix}1\\0\\1\end{bmatrix}$

(2) $\begin{bmatrix}1\\1\\1\end{bmatrix}, \begin{bmatrix}1\\1\\-2\end{bmatrix}, \begin{bmatrix}1\\-1\\0\end{bmatrix}$

(3) $\begin{bmatrix}1/\sqrt(3)\\1/\sqrt(3)\\1/\sqrt(3)\end{bmatrix}, \begin{bmatrix}1/\sqrt{6}\\1/\sqrt{6}\\-2/\sqrt{6}\end{bmatrix}, \begin{bmatrix}1/\sqrt{2}\\-1/\sqrt{2}\\0\end{bmatrix}$

Which of these bases are orthogonal?

- A. 1
- B. 2
- C. 3

Which of these bases are orthonormal?

- A. 1
- B. 2
- C. 3

Answer(s) submitted:

- BC
- C

submitted: (correct)
recorded: (correct)

Problem 2. **(1 point)**

Let a subspace V of $\mathbb{R}^3$ be spanned by $\begin{bmatrix}1/\sqrt{2}\\0\\1/\sqrt{2}\end{bmatrix}$ and $\begin{bmatrix}0\\1\\0\end{bmatrix}$. Find the projection of $\begin{bmatrix}1\\-2\\3\end{bmatrix}$ onto V.

Projection = $\begin{bmatrix}\_\_\\\_\_\\\_\_\end{bmatrix}$

Answer(s) submitted:

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

submitted: (correct)
recorded: (correct)

Problem 3. **(1 point)**

Let V be a subspace of $\mathbb{R}^3$, with a basis given by $\{\vec{v}_1\} = \{\begin{bmatrix}1/\sqrt{2}\\0\\1/\sqrt{2}\end{bmatrix}\}$.

(a) What is the dimension of $V^\perp$?
$\dim(V^\perp) =$ __________

(b) What is a vector $\vec{v}$ in $V \cap V^\perp$?
$\vec{v} = \begin{bmatrix}\_\_\\\_\_\\\_\_\end{bmatrix}$

(c) If $|\vec{w}\cdot\vec{v}_1| = 0.7$, consider the following propositions:
(i) $\vec{w} \in V$; (ii) $\vec{w} \in V^\perp$; or (iii) neither of these.
Which of these is possible?

- ?
- (i)
- (ii)
- (iii)
- (i) or (ii)
- (i) or (iii)
- (ii) or (iii)
- (i), (ii), or (iii)

Answer(s) submitted:

- 2
- $\begin{bmatrix}0\\0\\0\end{bmatrix}$
- (i) or (iii)

submitted: (correct)
recorded: (correct)