

1. Find a vector $\overrightarrow{\mathbf{x}} \in \mathbb{R}^{3}$ that is orthogonal to $\overrightarrow{\mathbf{u}_{1}}$.
2. Find a vector $\overrightarrow{\mathbf{y}} \in \mathbb{R}^{3}$ that is orthogonal to both $\overrightarrow{\mathbf{u}_{1}}$ and $\overrightarrow{\mathbf{u}_{2}}$.
3. Find all vectors $\overrightarrow{\mathbf{z}} \in \mathbb{R}^{3}$ that are orthogonal to $\overrightarrow{\mathbf{u}_{1}}, \overrightarrow{\mathbf{u}_{2}}$, and $\overrightarrow{\mathbf{u}_{3}}$.
4. Let $A$ be the matrix formed by putting $\overrightarrow{\mathbf{u}_{1}}, \overrightarrow{\mathbf{u}_{2}}, \overrightarrow{\mathbf{u}_{3}}$ in the rows of $A$
(a) How are the vectors $\overrightarrow{\mathbf{z}}$ from \#3 related to $\operatorname{row}(A)$ ?
(b) In which fundamental subspace of $A$ do the vectors $\overrightarrow{\mathbf{z}}$ from \#3 lie?
