

Section 5.2 Gram Schmidt and QR Factorization (Part 1)

Examples

P 1. Show that $\begin{bmatrix} \cos(\theta) \\ \sin(\theta) \end{bmatrix}$ and $\begin{bmatrix} -\sin(\theta) \\ \cos(\theta) \end{bmatrix}$ are orthonormal vectors.

P 2. Find orthonormal vectors \vec{u}_1 and \vec{u}_2 in the subspace $V = \text{span}\left(\begin{bmatrix} 2 \\ 1 \\ -2 \end{bmatrix}, \begin{bmatrix} 2 \\ 7 \\ -8 \end{bmatrix}\right)$ such that $V = \text{span}(\vec{u}_1, \vec{u}_2)$. Check your answer.

P 3. Find a 2×2 matrix R such that $\begin{bmatrix} 2 & 2 \\ 1 & 7 \\ -2 & -8 \end{bmatrix} = \frac{1}{3} \begin{bmatrix} 2 & -2 \\ 1 & 2 \\ -2 & -1 \end{bmatrix} R$. Check your answer.