

Gram-Schmidt Orthogonalization

1. Let A be an $m \times n$ matrix with linearly independent columns x_1, x_2, \dots, x_n . Applying the Gram-Schmidt process to x_1, x_2, \dots, x_n will produce
 - (a) an orthogonal basis for A .
 - (b) an orthogonal basis for the column space of A .
 - (c) an orthogonal basis for the row space of A .
 - (d) an orthogonal basis for the null space of A .

2. Let $v_1 = (2, -1, 0)$ and $v_2 = (1, 1, 1)$. The Gram-Schmidt process, when applied to these vectors, produces $\{v'_1, v'_2\}$ where
 - (a) $v'_1 = (2, -1, 0)$ and $v'_2 = (-1, 2, 1)$.
 - (b) $v'_1 = (2, -1, 0)$ and $v'_2 = (3/5, 6/5, 1)$.
 - (c) $v'_1 = (2, -1, 0)$ and $v'_2 = (2/5, -1/5, 0)$.
 - (d) $v'_1 = (2, -1, 0)$ and $v'_2 = (7/5, 6/5, 1)$.
 - (e) $v'_1 = (2, -1, 0)$ and $v'_2 = (3/2, 3, 1)$.

3. **True or False** If $W = \text{span} \left\{ \begin{bmatrix} 2 \\ -1 \\ 0 \end{bmatrix}, \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix} \right\}$, then $S = \left\{ \begin{bmatrix} 2 \\ -1 \\ 0 \end{bmatrix}, \begin{bmatrix} 3 \\ 6 \\ 5 \end{bmatrix} \right\}$ is an orthogonal basis for W .
 - (a) True, and I am very confident
 - (b) True, but I am not very confident
 - (c) False, but I am not very confident
 - (d) False, and I am very confident