

1. Determine the value of x so that $\mathbf{v} \cdot \mathbf{w} = 0$, where $\mathbf{v} = \begin{bmatrix} x \\ 1 \\ -6 \end{bmatrix}$ and $\mathbf{w} = \begin{bmatrix} 2 \\ -2 \\ 1 \end{bmatrix}$.

2. Determine a scalar r such that $A\mathbf{x} = r\mathbf{x}$, where $A = \begin{bmatrix} 1 & 2 & -1 \\ 1 & 0 & 1 \\ 4 & -4 & 5 \end{bmatrix}$ and $\mathbf{x} = \begin{bmatrix} -\frac{1}{2} \\ \frac{1}{4} \\ 1 \end{bmatrix}$.

3. Let $A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 1 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 0 \\ 2 & 1 \\ 3 & 2 \end{bmatrix}$.

(a) Compute AB .

(b) Compute BA .