Let

$$\vec{u} = \begin{bmatrix} -1 \\ 4 \\ 1 \\ -4 \end{bmatrix}, \quad \vec{v} = \begin{bmatrix} 1 \\ -3 \\ -1 \\ -4 \end{bmatrix},$$

and let W the subspace of $\mathbb{R}^4$ spanned by $\vec{u}$ and $\vec{v}$. Find a basis of $W^{\perp}$, the orthogonal complement of W in $\mathbb{R}^4$.

$$\left\{ \begin{bmatrix} \square \\ \square \\ \square \\ \square \end{bmatrix}, \begin{bmatrix} \square \\ \square \\ \square \\ \square \end{bmatrix} \right\}$$

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$$\left\{ \begin{bmatrix} 1 \\ 0 \\ 1 \\ 0 \end{bmatrix}, \begin{bmatrix} 28 \\ 8 \\ 0 \\ 1 \end{bmatrix} \right\}$$