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**Quiz for June 12, 2006**

Let  $\mathbf{a}$  and  $\mathbf{b}$  be vectors in  $\mathbb{R}^3$ , and let  $W$  be the subset of  $\mathbb{R}^3$  defined by

$$W = \{\mathbf{x} \mid \mathbf{a}^T \mathbf{x} = 0 \text{ and } \mathbf{b}^T \mathbf{x} = 0\}.$$

Prove that  $W$  is a subspace of  $\mathbb{R}^3$ .

**ANSWER:** We see that  $W$  is the nullspace of the matrix

$$\begin{bmatrix} \mathbf{a}^T \\ \mathbf{b}^T \end{bmatrix}.$$

We know that the Null space of every matrix is a vector space.