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Have a look at the following links:

1. [Orthogonal complement](#)
2. [Orthogonal decomposition](#)

The key points are

- If we look at an n -dimensional vector space V and a k -dimensional subspace $W \subset V$, then the orthogonal complement W^\perp is an $(n - k)$ -dimensional subspace of V and contains all vectors in V that are orthogonal to every vector in W .

- Every vector $\mathbf{x} \in V$ can be (uniquely) decomposed into $\mathbf{x} = \sum_{i=1}^k \lambda_i \mathbf{b}_i + \sum_{j=1}^{n-k} \psi_j \mathbf{b}_j^\perp$,
 $\lambda_i, \psi_j \in \mathbb{R}$, where $\mathbf{b}_1, \dots, \mathbf{b}_k$ is a basis of W and $\mathbf{b}_1^\perp, \dots, \mathbf{b}_{n-k}^\perp$ is a basis of W^\perp .

[Mark as completed](#)

