Test

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(Exercise 12345). Suppose V is a finite-dimensional vector space and U is a subspace of V such that $\dim U = \dim V$. Prove that $U = V$.

Proof. Let $B_U := (u_1, ..., u_n)$ be a basis of U. As a basis, B_U is linearly independent. Since $\dim U = \dim V$, the length of B_U is the dimension of V. It follows that B_U is, moreover, a basis of V, because every linearly independent list of the right length is a basis for a finite-dimensional vector space. $\square$