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homogeneous linear problem

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Let $L : U \rightarrow V$ be a linear mapping. A linear equation is called *homogeneous* if it has the form

$$L(u) = 0, \quad u \in U.$$

A homogeneous linear problem always has a trivial solution, namely $u = 0$. The key issue in homogeneous problems is, therefore, the question of the existence of non-trivial solutions, i.e. whether or not the kernel of L is trivial, or equivalently, whether or not L is injective.