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onto linear transformation, definition of

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The linear transformation $T : \mathbb{R}^n \to \mathbb{R}^m$:

$$T(\mathbf{x}) = A\mathbf{x}$$

is onto iff Col A spans $\mathbb{R}^m$. However, if the corresponding homogeneous system has only the trivial solution, the transformation is one-to-one.