1096-F1-1536 **Gilbert Strang***, Dept. of Mathematics, MIT, Cambridge, MA 02139. *Row rank equals column rank: Three good proofs.*

This is the first big theorem in linear algebra: the row space and column space have the same dimension. Here are three approaches and there are more—we will reveal our favorite. We hope the audience has favorites too, and experience with presentation to students.

1. Reduce the matrix to echelon form and compute dimensions.
2. Independent $x_1, \ldots, x_r$ in the row space give independent $Ax_1, \ldots, Ax_r$ in the column space.
3. If the rows of W are a basis for the row space of A, then $A = UW = (m \text{ by } r)\ (r \text{ by } n)$. Then the r columns of U span the column space of A.

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