1035-M1-1159 **Jack W. Rogers, Jr.*** (rogerj2@auburn.edu). *Matrices and Their Adjoints.* Preliminary report.

The following approach is the result of several years spent trying to unify continuous and discrete applications of linear algebra in a sophomore-junior level course.

A matrix is a row of vectors in an inner product space Σ with a matrix-vector product $V\,\vec{c}$ defined in the usual way for all $\vec{c} \in \mathbf{R}^n$. The adjoint of V is a column of functionals with an adjoint-vector product $V^*\vec{s}$ of inner products of vectors in V with all $\vec{s} \in \Sigma$. A standard $m \times n$ matrix can be considered as the matrix of its columns, or as the matrix-adjoint of its rows, and the adjoint is the transpose. In this treatment, however, a matrix is not in general a matrix-adjoint, nor is a matrix-adjoint a matrix.

We discuss the basic theory of linear algebra in the light of these definitions, including the fundamental theorem of linear algebra, matrix decompositions (singular value, QR), least-square fits, etc. (Received September 18, 2007)