1135-15-1430   **Harm Derksen*** (`hderksen@umich.edu`), Ann Arbor, MI 48109-1043. *Singular Values for Tensors.*

The Singular Value Decomposition (SVD) for matrices has many applications. It can be used for finding low rank approximations of a matrix. In Principal Component Analysis (PCA) it is used for dimension reduction of data. There are generalizations of the SVD to higher order tensors. One generalization is the low rank tensor decomposition (known as the CP, CANDECOMP or PARAFAC decomposition). This decomposition is not numerically stable which can be problematic in applications. Another generalization is the Tucker decomposition (or Higher Order Singular Value Decomposition) which is numerically stable but does not typically give low rank decompositions. We will discuss other, new generalizations of the SVD, the Diagonal Singular Value Decomposition and the Slope Decomposition, and how such decompositions can be used to generalize PCA. (Received September 22, 2017)