1100-15-297 **Harm Derksen*** (`hderksen@umich.edu`). *Tensor Decompositions.*

A d-way array can be viewed as a tensor product: $V = V_1 \otimes V_2 \otimes \cdots \otimes V_d$. For a given tensor $v \in V$, the PARAFAC/CANDECOMP problem asks to find a decomposition $v = v_1 + v_2 + \cdots + v_r$ where $v_1, v_2, \ldots, v_r$ are pure tensors and r is minimal. The number r is called the rank of the tensor v. The PARAFAC/CANDECOMP problem has many applications, for example in psychometrics, chemometrics, signal processing and algebraic complexity theory. I will discuss uniqueness, numerical stability and applications. Instead of minimizing r one may also minimize $\|v_1\| + \|v_2\| + \cdots + \|v_r\|$. This minimal value is the nuclear norm of the tensor v. For $d = 2$ such a decomposition is a Singular Value Decomposition. Things get more complicated for $d \geq 3$. I will discuss ways for generalizing the Singular Value Decomposition for $d \geq 3$, at least for some tensors. (Received February 10, 2014)