## 1145-57-2897 Alan Durfee\* (adurfee@mtholyoke.edu). Rankings, combinatorial Hodge theory and statistics. Preliminary report.

Suppose there are sports teams playing one another. We know the scores of each match, and we would like to use these scores to rank the teams. There are a number of methods for doing this, and I will describe two of them. The first rather sophisticated method is from a paper by Jiang et al (2011). It sets up the teams and matches as a one-dimensional simplicial complex K; a team corresponds to a vertex and a match to an edge. (Not all teams play one another so not all vertices are connected by edges.) A score then becomes an element of  $C^1(K)$  and rank to an element of  $C^0(K)$ . Combinatorial Hodge theory (Eckmann, 1945) applied to this situation gives a ranking. Another more elementary was described by Massey in his undergraduate senior thesis (1997). It reworks the problem of finding a ranking to a problem in regression analysis. Under some simple assumptions these two methods are the same; the operators of combinatorial Hodge theory correspond to the equations of regression. I will explain how this happens. (Received September 25, 2018)