1128-00-311 **Michael Newsham*** (michael.newsham@wsu.edu). *Divergence, Permutations, and the Axiom of Choice: Exploring Cardinalities of Infinite Symmetric Groups.*

We provide motivation for the study of the permutation group on a finite set by providing introductory examples of its applications in algebraic contexts before generalizing the notion of the permutation group on finite sets to the infinite case. We use these permutation groups to draw connections between Hilbert's Grand Hotel and properties of conditionally convergent series in order to illustrate that the permutation group and power set of a countably infinite set have equal cardinalities. Finally, we discuss the importance of the axiom of choice in establishing that this result is true in general for infinite sets. (Received February 28, 2017)