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*Using Analysis of Algorithms to Derive Combinatorial Equalities.*

Two algorithms are analyzed and compared and the results obtained lead to combinatorial formulas which we then prove. The first one finds the greatest and the second greatest element of an array and the second one finds the smallest and the second smallest element. We use permutations to analyze their behavior for all possible inputs. The algorithms and the combinatorial formulas derived from the two algorithms are different but their average behavior is similar. This helps us to develop some equalities which might be harder to obtain in other ways. In setting them up and in proving them we first analyze the outputs given by a program we created, in order to find patterns. This helps us to use other auxiliary formulas for proving them. (Received September 21, 2009)