COS 488 Problem Set #9 Question #2

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I made two programs, the first (prog4_1.py) generates a set of random permutations of a given length and then produces the ratio of permutations that didn't have 1- or 2-cycles. The second (prog4_1 (2).py) generates all the permutations of a given length and then gives the corresponding ratio.

Running the second program on permutations of length 10, my program outputs a ratio of 0.223174603175. Our asymptotic estimate for the coefficients of the generating function is $e^{-H_2} = e^{-3/2} \approx 0.22313016014842982893$, so this gives about a .019918% error.

For permutations of length 20, it is not feasible to look at all 20! permutations so we randomly generated 10^6 permutations, which produces a ratio of .223416, giving an approximate error of .128105%.