

Exercise Sheet 6*Elias Koutsoupias (with thanks to Stefan Kiefer and Stanislav Živný)*

1. Give an FPRAS for the variant of DNF counting in which we are given a DNF formula and an integer k and we want to estimate the number of satisfying assignments in which exactly k of the variables are true.
2. Consider the following Markov chain for shuffling n cards. In each step, we pick two cards independently and uniformly at random and exchange their positions.
 - Prove that this Markov chain will converge to the uniform distribution (of all permutations) from any initial permutation.
 - Prove that $\tau(\epsilon) \leq O(n^2 \log(1/\epsilon))$.
3. What is the mixing time $\tau(\epsilon)$ of the lazy random walk on the n -dimensional hypercube?