Homework 12 – Due Friday, April 24, 2020 by noon on Gradescope.

Submit solutions to all problems on separate sheets. They will be graded by different people.

Page limit  You can submit at most 1 sheet of paper per problem, even if the problem has multiple parts. If you submit a longer solution for some problem, only the first sheet of paper will be graded.

Reminder  Collaboration is permitted, but you must write the solutions by yourself without assistance, and be ready to explain them orally to the instructor if asked. You must also identify your collaborators and whether you gave help, received help, or worked something out together. Getting solutions from outside sources such as the Web or students not enrolled in the class is strictly forbidden.

Exercises  Please practice on exercises in Chapter 6 of Mitzenmacher-Upfal.

Problems


2. Exercise 6.21.

   Hint: Recall that we proved that ALG makes at most one top-level call to Fix(C) at most once for each clause C.

3. (Algorithmic LLL) Show that given an integer $n$, it is possible to find, in time $n^{O(k)}$, a coloring of the edges of the complete graph $K_n$ with 3 colors such that no $k$-clique is monochromatic (that is, has all its edges colored the same way) as long as $8\binom{k}{2} \left(\frac{n-2}{k-2}\right)(3^k - 1) \leq 1$.

   Hint: Use (with some modifications) the algorithmic version of the Lovasz Local Lemma.

4. (Midterm-substitution problem, no collaboration allowed) From the moment you read this problem until you complete your solution, please do not search the internet for anything related to this problem.

   The full version of this assignment, including this problem, will be posted by Monday on piazza under “Resources”.