COMP 550, Spring 2015
Assignment 7
DUE: 9:05 Apr 10, 2015

1) (15') CLRS 22.3-2 on pages 610-611
2) (30') CLRS 22-1 on page 621
3) (30') CLRS 15-5 on pages 406-407
4) (25') CLRS 15-8 on page 409

The O(mn)-time algorithm for the longest-common-subsequence problem appears to be a folk algorithm. Knuth [1] posed the question of whether subquadratic algorithms for the LCS problem exist. Masek and Paterson [2] answered this question in the affirmative by giving an algorithm that runs in O(mn/lgn) time, where n<=m and the sequences are drawn from a set of bounded size. For the special case in which no element appears more than once in an input sequence, Szymanski [3] shows how to solve the problem in O((n+m)(lg(n+m)) time. Many of these results extend to the problem of computing string edit distances (Problem 15-5).

If you want to learn more about this image-compression technique (Problem 15-8), please refer to [4]. A quick introductive video can be found at: *https://www.youtube.com/watch?v=vIFCV2spKtg*

[1] V. Chv´atal, D. A. Klarner, and D. E. Knuth. Selected combinatorial research problems. Technical Report STAN-CS-72-292, Computer Science Department, Stanford University, 1972.
[2] William J. Masek and Michael S. Paterson. A faster algorithm computing string edit distances. Journal of Computer and System Sciences, 20(1):18–31, 1980.
[3] T. G. Szymanski. A special case of the maximal common subsequence problem. Technical Report TR-170, Computer Science Laboratory, Princeton University, 1975.
[4] Shai Avidan and Ariel Shamir. Seam carving for content-aware image resizing. ACMTransactions on Graphics, 26(3), article 10, 2007.

Rules for ALL HWs (in addition to the statements in the syllabus):

You are encouraged to discuss the problem sets and study together in group, but when it comes to formulating/writing solutions you must work alone independently; i.e., you should be able to explain your answer clearly to anyone else. Note that this says discuss in group — copying homework solutions from another student, from the Internet, solution sets of friends who have taken this course or one similar to it previously, or other sources will be considered **cheating** and referred to the student attorney general. *You must include a **signed honor statement** with each submission explicitly listing the people you worked with and stating that you completed the assignment in accordance with these rules.*