

COMP 550, Spring 2015

Assignment 2

DUE: 9:05 Feb 2, 2015

1) (12') Stable Matching

Recall the Stable Matching Problem we've covered, where we are given a full set of preferences among n hospitals and n medical school students, and would like to find ONE stable assignment, where there is no *unstable* pair. Given an assignment, doctor x and hospital A are unstable if:

- (i) x prefers A to its assigned hospital, and
- (ii) A prefers x to its admitted student.

Apply the "reversed" Boston Pool Algorithm to the following preferences (Students: q, r, s, t , Hospitals: A, B, C, D), where in each round, an arbitrary unassigned student makes offer to the most preferred hospital that has not already rejected him/her, and each hospital ultimately accepts the best offer that it receives, according to its preference list.

q	r	s	t	A	B	C	D
A	A	B	D	t	r	t	s
B	D	A	B	s	t	r	r
C	C	C	C	r	q	s	q
D	B	D	A	q	s	q	t

- 2) (12') Solve the recurrence form: $T(n) = T(\alpha n) + T((1 - \alpha)n) + n$, first by applying the recurrence tree method to generate a guess (you should draw a tree with 3 levels and dots, and clarify how many levels in total are there, and the sum of each level), and then formally prove it with the substitution method.
- 3) (40') CLRS 4-1 (Hint: Applying the Master Theorem whenever possible would be less painful most of the time when you are asked to "justify your answers" – make sure you justified which case are you referring to.)
- 4) (36') CLRS 4-3 e, f, h

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.*