BLG372E (Analysis of Algorithms), Spring 2012
Homework 1

Total Worth: 5% of your grade
Handed Out: 21.02.2012
Due: 27.02.2012 16:30

In Fictional Technical University (FTU), there are n classrooms. Classroom c_i can contain d_i students in the exam sitting order. On the other hand, there are m lectures offered in FTU where lecture l_i is offered to k_i students.

In this fictional university, at the end of the semester, finals take place every day (including sunday and saturday) and there can be at most two exams in a day (morning and afternoon). Now answer the following questions considering any lecture l_i, $\sum_{i=1}^{n} d_i \geq k_i$.

Problem # 1

(30 points)

Propose an algorithm to assign exams to the classes. Your algorithm must produce an assignment which results in the smallest possible number of days of final exams period.

Problem # 2

(30+ points)

Show your algorithm step by step for a classroom and a lecture set. Discuss, what are the weak points of your algorithm. For each weak point you find, you gain 5 points, if i find a weak point that you didn't mention, you lose 10 points.

Problem # 3

(40+ points)

Now consider that the minimum fragmentation is another efficiency measurement for your algorithm. Fragmentation here can be defined as the difference between number of students that are registered for lecture l_i and number of

available seats in classrooms which are assigned to l_i for final. For instance, assigning lecture l_i with 70 students to classrooms c_k and c_l where $d_k = 60$ and $d_l = 60$ is worse than assigning the same lecture to c_m and c_n where $d_m = 40$ and $d_n = 40$. Because fragmentation is 50 in the first assignment and 10 in the second assignment. Give an efficient algorithm for minimum fragmentation and minimum final period. Discuss your algorithm as in problem # 2.

Academic Honesty Policy

You may discuss the problem addressed by the homework at an abstract level with your classmates, but you should not share or copy the solution from your classmates or from Internet. You should submit your own, individual homework. Plagiarism and any other forms of cheating will have serious consequences, including failing the course.

Submission Instruction

Please drop the hard copy of your homework into the bin named 'Analysis of Algorithms' in the department secretary's room next to the faculty mail boxes. If a question or statement is not clear, please let the teaching assistant Ahmet Aycan Atak know by email (ataka@itu.edu.tr).