

SYDE 423 - Fall 2008. Assignment 4.

Assigned Monday Nov 3rd. Due Wednesday Nov 12.

1. From the textbook, solve the following:

- Question 3 in Exercises 9.1
- Questions 4 and 6 in Exercises 9.4
- Questions 2(*a* – only) and 3 in Exercises 10.2
- Question 3 in Exercises 10.3

2. Question 9 in Ch 7 of the textbook by Kleinberg and Tardos. It is summarized here as follows.

Network flow issues arise in dealing with natural disasters and emergency crises that require quick evacuation of large numbers of people. Consider the following example. There are n injured people distributed across a given region who need to be rushed to hospitals. There are k hospitals and each of the n people needs to be transferred to one of the closest hospitals (say within half-hour drive). That is, different people can be brought to a number of different hospitals depending on their location. Moreover, a good handling of the situation requires that we do not overload any of the hospitals. To balance the load, we want each hospital to receive at most $\lceil n/k \rceil$ people. Describe how a flow network can be used for determining whether or not it is possible to transfer each of the injured people in such a way as the hospitals are not overloaded. Determine the problem size in terms of n and k and give the run time bound of the required algorithm. (**Hint:** A modification is needed in the way a flow network is constructed for solving a maximum bipartite matching problem.)