CS 180 Homework 5

March 10, 2015

1 Mobile Computing

Design a polynomial-time algorithm for the following problem: Given the positions of a set of clients and a set of base stations, decide whether every client can be connected simultaneously to a base station, subject to the range and load constraints.

2 Simple Maximum Flow

(a) Find a maximum flow; how many planeloads of people can we move from MDL to LAX?

(b) Find a minimum cut for this network, and give its capacity.

(c) Is the minimum cut unique? (Is there any other cut with the same capacity?)

3 Min Flow / Max Cut

(a) Give a polynomial time algorithm that finds the minimum possible flow on G.

(b) Consider any minimum flow f. Is it true that it corresponds to some maximum cut ? That is, for networks like this, is there a Min Flow / Max Cut theorem? If so, prove it; if not, give a counterexample.

4 Directed Hamiltonian Path

Show that the Directed Hamiltonian Path problem is NP-complete. Show that this problem is in NP, then show that it is NP-hard by reduction from some other problem