Algorithms – handout 8

Approximation Algorithms

December 30, 1999

We shall finish the proof that Edmonds' algorithm finds a matching of maximum cardinality.

Then we shall discuss approximation algorithms for NP-hard optimization problems. We will show that the greedy algorithm approximates set cover within a ratio of $\ln n$, and that Christofides' algorithm approximates metric TSP within a ratio of 3/2.

Homework:

1. For an instance of (unweighted) set cover, let k denote the cardinality of the set of maximum cardinality. Show that the greedy algorithms approximates set cover within a ratio of $c + \ln k$, where c is a (small) universal constant.

2. Christofides' algorithm for metric TSP needs a subroutine for finding perfect matchings of minimum weight. Show a polynomial time reduction from the problem of finding perfect matchings of minimum weight to that of finding a maximum weight matching.