

CSci 421  
Introduction to Algorithms  
Homework Assignment 5  
Due: Wednesday, 23 Feb 2000

Winter 2000

February 22, 2000

Reading in Chapter 7: 7.1, 7.3, 7.5, 7.6 (although I gave a different algorithm in lecture), 7.7, 7.8, 7.9 intro + 7.9.2, 7.10, 7.11, 7.13.

Homework:

1. Let  $G$  denote a connected undirected graph with weighted edges. The weights need not be distinct. A *cut* of  $G$  is simply a partition of its vertices into two nonempty subsets; an edge *crosses the cut* if one end point is in one part of the partition and the other endpoint is in the other part.

Prove or disprove the following:

**Conjecture** Let  $e$  be an edge of  $G$ . Then the following statements are equivalent:

- (a) There exists a minimum spanning tree containing the edge  $e$ ;
  - (b) Every simple cycle containing  $e$  contains another edge at least as heavy as  $e$ ;
  - (c) There exists a cut crossed by  $e$  for which every edge crossing the cut is at least as heavy as  $e$ ;
2. 7.7
  3. 7.3
  4. 7.16. You may use *increasing* DFS numbers and LOW values (as in lecture) rather than decreasing numbers/HIGH values (as in text) if you prefer. Say which you're doing.
  5. 7.17
  6. 7.91 Assume every vertex in  $G$  is incident to at least one edge.