

## DM19 – Fall06 – Weekly note 9

### Stuff covered November 16, 2006

Cook's proof that Satisfiability is NP-complete. DM19 notes from Papadimitriou & Steiglitz pages 314 and 352-359. We also finished Section 34.5.

### Exercises November 14, 2006

- 34-1 (a)-(c)
- 34.3
- Show that the following problem is NP-hard: Given a connected graph  $G$ . Find a spanning tree  $T$  so that the maximum degree of a vertex in  $T$  is as small as possible. The degree of a vertex in  $T$  is the number of edges in  $T$  which has that vertex as one of its endvertices.
- Recall that a graph  $G = (V, E)$  is 2-edge-connected if and only if no matter how we partition  $V$  into disjoint sets  $U, V \setminus U$  there are at least two edges from  $E$  with one end in each of  $U$  and  $V \setminus U$ . Show that the following problem is NP-hard: Given a 2-edge-connected graph  $G = (V, E)$ . Find a minimum size subset  $E' \subseteq E$  so that the graph  $G' = (V, E')$  (i.e. using only the edges from  $E'$ ) is 2-edge-connected.
- Show that the travelling salesman problem is NP-complete even if all costs are either 1 or 2.

### Lecture November 22, 2006

Approximation algorithms. Chapter 35.