DM19 – Fall06 – Weekly note 2

Stuff covered September 4 and 6th

I covered the notes on Hamiltonian paths in tournaments, lower bounds for sorting, optimal algorithms for finding maximum and minimum together as well as well as for finding the second largest element. Finally, I introduced techniques for proving lower bounds for such problems via orientations in graphs and used this method to show that the two algorithms given are optimal.

Correction: In the lecture on September 6, I said that red arcs were always useless when discussing the lower bound for second smallest element. That is not true! They are useless for determining the minimum element only. The point then is that we must generate at least $\lceil \log N \rceil$ red arcs before we also have the second smallest element.

Lecture, September 13

No lecture. Uffe will take these for the extra classes as described on Weekly note 1.

Problems for September 12 and 13

See Weekly note 1. If there is extra time, you may also discuss comparison tree representations for merge sort and heapsort for sorting of 4 elements.

Problems for September 19

Exercises 1-5 on page 11 in JBJ notes on lower bounds

Exercises 3.3, 3.5, 3.6 (a) on page 140 in Baase.

Discuss algorithms for finding both the maximum and the second smallest element. Try to get the best complexity and try to give an adversary lower bound.

Lecture, September 20

Indicator random variables. Cormen sections 5.1 and 5.2

Randomized Quicksort. Cormen Sections 7.3 and 7.4

Selection in expected and guaranteed linear time. Cormen Sections 9.2 and 9.3.

Lower bound for finding the median. JBJ notes pages 8-11 and DM19 Notes Baase 138-140.