

# Advanced Analysis of Algorithms

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October 29, 2013

1. Dijkstra's algorithm from Cormen. Cover relaxation and all the associated properties.
2. First introduce  $d[v]$  and  $\delta(v)$ .
3. Go through the proof of Dijkstra and analysis.
4. The MST problem.
5. Why does Kruskal produce a spanning tree?
6. Prim's algorithm. Is a spanning tree produced? Is the MST produced? Analysis.
7. The cut rule and cycle rule.
8. Task scheduling to minimize number of machines.  $(s_i, f_i)$ .  $T_i$  and  $T_j$  are said to be non-conflicting if  $f_j \leq s_i$  or  $f_i \leq s_j$ . Rule: Sort the jobs by order of start times. Find the first machine with no task conflicting with this task. If none exists, assign the task to a new machine.
9. Scheduling to minimize wait time on a single machine. Examples from book. Smallest job first.
10. Scheduling with deadlines and profits. Go through most of the analysis except the theorem that establishes optimality.