

CSEP 521 – Applied Algorithm
Spring 2003
Homework 9.
Due date: 6/4/03

Calculating final grades:

*The final grade will be $0.5 * \text{final exam} + 0.5 * \text{hw grade}$.*

*Calculating homework grade: Let h be the average of your **eight** best hw grades (in hw2 take grade/0.80 and in hw3 take grade/1.2).*

HW grade = $\min(100, h+5)$

You don't have to submit this homework if you are satisfied with your first 8.

- 1.** (30 points) In class we argued that EDD rule is optimal for minimizing the maximal tardiness on one machine ($1||T_{\max}$, slides 16). Prove that the problem $P2||T_{\max}$ is NP-hard (same problem, two identical machines).

- 2.** (35 points) Complete the optimality proof of Least-Cost-Last (LCL) algorithm: Prove Claim 2 in slide 26.

- 3.** (35 points) Consider a multimedia on demand system in which each client wants to listen to one song, and a single broadcast channel can transmit the songs. For each client, j , we know the length p_j of the song he wishes to hear. All the clients arrive at the same time.
The problem is to minimize the average *waiting time* of a client.
The waiting time is the time elapsing until the song transmission starts (whereas the completion time is the time in which the song is over).

Select (a) or (b):

- (a) Prove that the problem is NP-Hard.
- (b) Give (and prove) an optimal poly-time algorithm for the problem.