

CS 4335 Tutorial 3

Question 1. Exercise for week 3. (See the website of week 3)

Question 2: (optional)

Suppose you are given a set $S = \{a_1, a_2, \dots, a_n\}$ of tasks, where task a_i requires p_i units of processing time to complete, once it has started. You have one computer on which to run these tasks, and the computer can run only one task at a time. Let w_i be the waiting time of task a_i , that is, the time at which task a_i starts. Your goal is to

minimize the average waiting time, that is, to minimize $\frac{1}{n} \sum_{i=1}^n w_i$. For example,

suppose there are two tasks, a_1 and a_2 , with $p_1=3$ and $p_2=5$, and consider the schedule in which a_2 runs first, followed by a_1 . Then $w_2=0$, $w_1=5$, and the average waiting time is $(0+5)/2=2.5$.

Give an algorithm that schedules the tasks so as to minimize the average *waiting* time. Each task must run non-preemptively, that is, once task a_i is started, it must run continuously for p_i units of time. What is the running time of your algorithm. Prove that the algorithm is correct.