
Consider the following scheduling problem on 1 machine with $n$ jobs. Each job has a processing time $p_j$, release date $r_j$, deadline $d_j$ and the problem is to decide in polynomial time whether these jobs can be processed by their deadlines while allowing preemption. Preemption means that a job can be interrupted and resumed later (and the total of amount of time spent on the job should be equal to $p_j$). Describe your algorithm and prove its correctness. The result should be typed (preferably in LaTeX).

If you prefer, you could consider the more general problem with $m$ machines, where each job can be processed on any machine. Each job can be preempted and resumed later on a different machine.) This can also be done in polynomial time.