

Name _____

No aids allowed. Answer all questions on test paper. Use backs of sheets if necessary.

Consider the Job Scheduling algorithm:

- 1: Sort the jobs in non-increasing order of profits: $g_1 \geq g_2 \geq \dots \geq g_n$
- 2: $d \leftarrow \max_i d_i$
- 3: **for** $t : 1..d$ **do**
- 4: $S(t) \leftarrow 0$
- 5: **end for**
- 6: **for** $i : 1..n$ **do**
- 7: Find the largest t such that $S(t) = 0$ and $t \leq d_i$, $S(t) \leftarrow i$
- 8: **end for**

In the proof of correctness, let S be the current schedule, and let i be the next job that needs to be considered. Since S is promising by the Induction Hypothesis, there exists an S_{opt} that extends S . Suppose that job i is assigned in slot t_0 , so S' is just like S except now there is job i in slot t_0 .

Suppose that S_{opt} did not have job i , so instead it has a job j in position t_0 . So we evict job j and replace it with job i in order to transform S_{opt} into S'_{opt} . Explain why S'_{opt} continues being an optimal schedule (that now extends S').