
CS 473: Undergraduate Algorithms, Spring 2009

HBS 3.5

1. Say you are given n jobs to run on a machine. Each job has a start time and an end time. If a job is chosen to be run, then it must start at its start time and end at its end time. Your goal is to accept as many jobs as possible, regardless of the job lengths, subject to the constraint that the processor can run at most one job at any given point in time. Provide an algorithm to do this with a running time that is polynomial in n . You may assume for simplicity that no two jobs have the same start or end times, but the start time and end time of two jobs can overlap.

2. Describe and analyze an algorithm that chooses one element uniformly at random from a data stream, without knowing the length of the stream in advance. Your algorithm should spend $O(1)$ time per stream element and use $O(1)$ space (not counting the stream itself).

3. Design and analyze an algorithm that return a permutation of the integers $\{1, 2, \dots, n\}$ chosen uniformly at random.