For the last three (greedy) problems, you are expected to

- Describe the greedy choice
- Justify this choice (this is the most important point, thinking exchange argument here)
- Describe your algorithm (code or maybe just a sentence or two)
- Give the time bound of the algorithm

1. The California Gold Rush (1848-1855) was one of the largest mass migrations in human history. Forty-niners came from across the globe – Oregon, China, Australia, Latin America, Hawaii, Europe, etc. – seeking to strike it rich mining for gold in the Sierra Nevada mountains. For a combination of reasons (illiteracy, language difference, secrecy, loss), there is no written record of the years each mine has operated. As such, a group of local historians is trying to infer when each mine operated from alternate records. As a starting point, these historians are focusing on a specific set of $n$ mines, and by cross-referencing various sources, these historians collected an initial set of records. Each record takes one of two possible forms, namely:

(a) That two mines from this set of $n$ operated simultaneously.
(b) The one mine from the set of $n$ closed before another mine (from the set of $n$) opened.

Assume that once a mine stopped operating, it remained closed forever.

Before considering additional mines beyond the $n$, they hired you to check whether their records have any internal contradictions and to determine a feasible ordering of their starting and closing dates (which are unknown). Provide an efficient algorithm that determines such an ordering of their starting and closing dates, or to say that the information is contradictory. Provide your algorithm’s runtime.

Hint: Map the records to a directed graph, and represent each mine as two connected nodes. Use topological sort.

2. exercise 5, p 190
3. exercise 7, pp 191-192
4. exercise 15, p 196