Problem 1. Archeologists have completed their exploration of a dig site and have collected fossils from the Paleolithic and Mesozoic eras. A fossil is the remnant of a prehistoric animal. They wish to classify the fossils into the two groups but it is very hard for them to directly label any one fossil. So they decide to adopt the following approach.

For each pair of fossils i and j, they study them carefully side by side. If they're confident enough in their judgment, then they label the pair (i, j) either **same** (meaning they believe both are from the same era) or **different** (meaning they believe they are from different eras). They also have the option of rendering no judgment on a given pair. So now they have the collection of n fossils, as well as a collection of m judgments for the pairs. They'd like to know if this data is consistent with the idea that each fossil is from the Paleolithic era or the Mesozoic era. So more specifically, we'll declare the m judgments to be consistent if it is possible to label each specimen either Paleolithic or Mesozoic in such a way that for each pair (i, j) labeled **same** it is the case that i and j have the same label; and for each pair (i, j) labeled **different,** it is the case that i and j have different labels. They are trying to do this by hand but is time consuming and boring and they realize that you are taking an Algorithms course and that you should have an algorithm that would answer this question right away. Design and code an algorithm that determines whether the m judgments are consistent.

Your submission for this assignment must include:

1. The worst case running time of your solution
2. A brief description of your approach and an indication of whether your code works
3. The output of running your algorithm using the *judgments* included in the file accompanying this assignment
4. All of the java code that you wrote.

Problem 2. The archaeologists hired specialists to analyze the fossils, which we'll denote F_1, F_2, ..., F_n. A fossil is the remnant of a prehistoric animal. The specialists have made conclusions about when the animals that gave rise to the fossils lived relative to one another. Each conclusion has one of the following two forms:

- For some i and j, the animal that gave rise to F_i died **before** animal F_j was born; or
- for some i and j, the life spans of the animals that gave rise to F_i and F_j **overlap**ped at least partially.

The archaeologists want to check on these conclusions before they publish their results. So they'd like you to determine whether the conclusions are at least internally consistent, in the sense that there could have existed a set of animals for which all these conclusions simultaneously hold. Give an efficient algorithm to do this task. If the conclusions are consistent, produce a list of potential dates of birth and death for each of the n animals so that all the facts hold true. For simplicity, let the birth date of the earliest animal be the year 100.

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