Programming component for homework #5 (20 points)

The Partition Problem: You are given a set of n (assume $n \leq 1000$) objects $O = \{O_1, \ldots, O_n\}$ and a symmetric dissimilarity function $D: O \times O \rightarrow \{0, 1, \ldots, m\}$ (assume $m \leq 10000$). The value $D(O_i, O_j) = D(O_j, O_i)$ denotes the measure of dissimilarity between objects O_i and O_j. You may assume that $D(O_i, O_i) = 0$ for all i. Your goal is to partition these objects into two sets A and B such that $P(A) + P(B)$ is minimized, where the function P is defined as:

$$\forall S \subseteq O, P(S) = max_{O_i, O_j \in S}\{D(O_i, O_j)\}$$

INPUT: The first line of the input is the value n. This is followed by $n - 1$ lines. The ith line among these, give the dissimilarity value of the ith object with objects $i + 1, i + 2, \ldots, n$ (separated by commas). Below, we give an example input file ("input.txt").

```
5
4,5,0,2
1,3,8
2,0
4
```

OUTPUT: The first line of the output should be the minimum value of $P(A) + P(B)$. The next two lines should give such sets A and B (in terms of the indices of objects separated by comma). Below we give an example output file. Below is the output file corresponding to the above input file.

```
4
1,2,4
3,5
```

SUBMISSION INSTRUCTIONS: All your program files should be in a directory named <Your Entry Number in Caps>. You will be asked to create a zip of this directory and submit this zip file. In this directory, there should be a makefile that will compile your code (read about makefile on the net in case you do not know what it is). This should create an executable called "partition" (in case you are using java/python, this could be a shell script). This when executed, should read the input file (input.txt) and write the answer in the output file. (output.txt).