

# Vacuum cleaning

Your flat consists of **N** rooms. Some pairs of rooms are connected by bidirectional corridors. You just bought a modern vacuum cleaner robot. When you turn it on, it repeats the following program.

- clean the current room
- randomly (with equal probability) pick one of the corridors leaving the room
- traverse the corridor to some other room

The robot has no memory. It is possible that it will clean some rooms and corridors multiple times before the entire flat is clean.

For each room and for each corridor you know the expected time the robot needs to clean it. A room is considered clean at the moment when the robot first leaves it. A corridor is considered clean at the moment when the robot finishes traversing it for the first time.

The total expected time until the entire flat is clean depends on the room in which you start the robot. Find all the rooms for which this time is shortest.

## Input

The first line of the input contains two integers **N** and **M** -- the number of rooms and the number of corridors.

Each of the next **N** lines describes a room: it contains the name of the room (a string of at most 30 non-whitespace characters) and a positive integer not exceeding 1000 -- the expected time to clean the room.

Each of the last **M** lines describes a corridor: it contains the names of two rooms and a positive integer not exceeding 1000 -- the expected time to traverse and clean the corridor.

You may assume that  $2 \leq N \leq 8$  and that the flat is a connected simple planar graph.

(I.e., the flat is connected, each corridor connects two different rooms, each pair of rooms is connected by at most one corridor, and all the rooms and corridors are located in the plane in such a way that no two corridors intersect.)

## Output

Output two lines. In the first line give a sorted space-separated list of all rooms in which it is optimal to start the robot. In the second line give the optimal expected cleaning time. Output at least 8 decimal places. A small imprecision will be tolerated.

## Examples

input	output
<pre>3 2 livingroom 10 kitchen 10 bedroom 10 livingroom kitchen 100 kitchen bedroom 100</pre>	<pre>bedroom livingroom 450.00000000</pre>
The expected time if we were to start the robot in the kitchen would be 560.	

input	output
<pre>3 3 livingroom 10 kitchen 10 bedroom 10 livingroom kitchen 100 kitchen bedroom 100 bedroom livingroom 100</pre>	<pre>bedroom kitchen livingroom 660.00000000</pre>
By symmetry, all starting points are equally good. Do not forget that you need to clean all rooms and all corridors (not just all rooms).	

input	output
<pre>6 6 livingroom 100 bedroom 80 hall 45 porch 70 kitchen 65 closet 20 livingroom bedroom 10 bedroom hall 30 livingroom hall 23 hall porch 40 livingroom kitchen 50 kitchen closet 1</pre>	<pre>closet 2122.04642857</pre>