Problem L: Hyperloop

The hyperloop is a new and fascinating mode of cat transportation. The cats sit in special capsules which “float” on a thin air layer in an almost vacuumed steel tube. The projected top speed is above $1\,000$ km/h. As you can imagine, the construction of the new hyperloop system is quite expensive and there is always a shortage of public money. Thus, we have to carefully decide where to build the first hyperloop route.

The current plan is to build the hyperloop next to the existing railway tracks and to upgrade the ordinary railway stations to hyperloop stations. The construction site is first erected at one of the stations and then moves through the rail network as the hyperloop gets constructed. Moving the construction equipment is quite expensive, so the building contract mandates that the construction site may never be moved without the machines doing any work. This means that it can not be moved along any railway track that was already upgraded and it is also not allowed to disassemble the construction site and resume construction from a different station.

You are given the two-dimensional coordinates of the railway stations as well as the directly connected stations. For simplicity reasons, we assume that the distance (in km) between two railway stations is the euclidean distance.

You have to select one route for the hyperloop so that the average travel time between any pair of stations in the upgraded network is minimized. When computing travel times you should assume that it is only possible to change trains (hyperloop or railway) at a station and that changing trains costs no time.

Input

The input consists of:

- one line with three integers n, r, and h ($2 \leq n \leq 15$; $100 \leq r \leq 200$; $800 \leq h \leq 1\,200$), where n is the number of railway stations, r is the average train speed in km/h and h is the average hyperloop speed in km/h;
- one line with with n coordinate pairs describing the positions of the railway stations; all coordinates are integers with absolute value at most $10\,000$;
- n lines; the i^{th} line specifying the direct connections of the i^{th} railway station:
  - the line starts with an integer c_i, the number of connections ($1 \leq c_i \leq 3$);
  - followed by c_i distinct integers listing the connected stations (0-indexed). Connections are always bi-directional and no station is directly connected to itself.

You may assume that there is at least one path to reach any station from any other station.

Output

On the first line of output, print the optimal average travel time (in hours) between any pair of different stations. The travel time should be accurate to an absolute or relative error of at most 10^{-6}.

On the second line, print the length k of the hyperloop track, followed by k numbers specifying the route of the hyperloop. The best answer may include the same station more than once. If there is more than one optimal answer, any will be accepted.

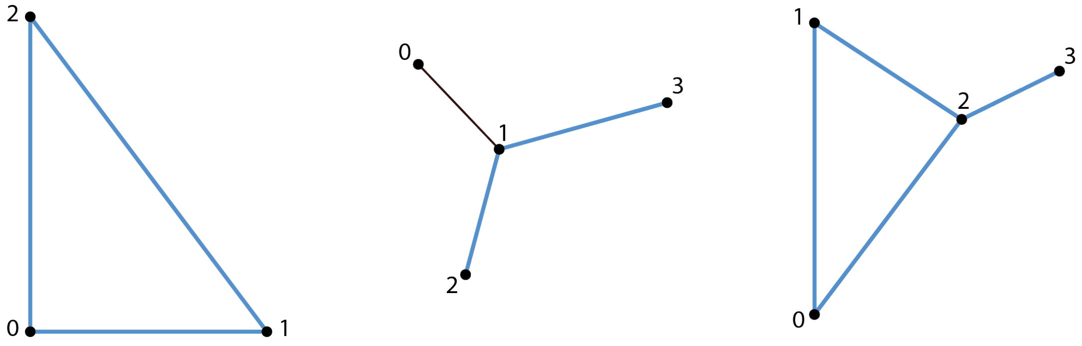

Figure L.1: Illustrations for the sample cases. The hyperloop is marked in blue. In the first sample, the optimal average time is calculated as $\frac{300+400+500}{3 \cdot 1000}$.

Sample Input 1

```
3 180 1000
100 100 400 100 100 500
2 1 2
2 0 2
2 0 1
```

Sample Output 1

```
0.4
4 1 0 2 1
```

Sample Input 2

```
4 150 800
-10 42 9 22 1 -8 49 33
1 1
3 2 0 3
1 1
1 1
```

Sample Output 2

```
0.137287398839
3 2 1 3
```

Sample Input 3

```
4 100 1000
0 0 0 600 300 400 500 500
2 1 2
2 2 0
3 1 3 0
1 2
```

Sample Output 3

```
0.498655108057
5 2 1 0 2 3
```