ETH Zurich
Institut für Theoretische Informatik
Prof. Dr. Angelika Steger
Prof. Dr. Emo Welzl
Prof. Dr. Peter Widmayer

Algorithms Lab

Exercise – *Algocoön Group*

The startup you created with your best friend is a great success. On impulse, you jointly decid to spend a big chunk of your profits on one of those ancient Greek sculptures depicting a group of mythological figures entangled in a complicated configuration.

You are presented with several sculptures to choose from. Unfortunately, you can afford only one sculpture and both of you would like to take it home. A brilliant idea you have is to hire a stonecutter to cut the sculpture in two parts.

Every sculpture consists of several figures, each of them equipped with (possibly large) number of limbs. Each limb reaches some other figure and has a cost that the cutter will charge for separating it.

The deal is as follows: you will decide on how to cut the sculpture (i.e., which figures you take home). Both you and your partner need to get at least one figure. To share the cost, you pay for cutting the limbs of your figures and your friend for limbs of her figures.

Your objective is to write a program that will go over all sculptures and for each of them find a cutting that minimizes *your* cost.

Input The first line contains $1 \leq t \leq 30$, the number of sculptures. For each sculpture, its description starts with a line containing `n m`, where $2 \leq n \leq 200$ is the number of figures and $0 \leq m \leq 5000$ total number of limbs.

m lines follow, each of them containing `a b c`, with $0 \leq a, b < n, a \neq b$ and $1 \leq c \leq 1000$, indicating that figure a has a limb that extends to figure b and its cutting cost is c. Note that a figure can have several limbs extending to another figure.

Output For each test case output two lines. In the first line, print the total cost of an optimal cut. In the second line, output the number of figures you are going to take home, followed by a space-separated list of those figures. In case there is more than one solution, output any of them.

Points You can score 100 points in total. There are two test sets:

1. For the first set, worth 40 points, you may assume $n \leq 50$ and $m \leq 1000$.
2. There are no restrictions for the second set, worth 60 points.

Sample input

```
1
5 11
0 1 2
0 3 1
2 0 1
0 2 5
3 1 4
4 2 5
4 0 2
3 2 5
1 3 4
2 4 4
3 0 6
```

Sample output

```
3
3 0 2 4
```

Note that the output is not necessarily unique.