Emergency Reinforcement

Input File	Output File	Time Limit	Memory Limit
standard input	standard output	5 seconds	256 MiB

There are N islands (numbered from 1 to N) connected by E two-way bridges (numbered from 1 to E). The bridges were built by one of K companies (numbered from 1 to K).

The i-th bridge connects island A_i and B_i, and was built by company C_i. The same pair of islands could be connected by more than one bridge. No bridge connects an island to itself.

Very soon, a large earthquake will hit the islands and destroy all of the bridges! Each company has X dollars that they can spend to *reinforce* bridges that they built, saving them from being destroyed by the earthquake. To reinforce the i-th bridge, company C_i must spend D_i dollars.

The companies would like to minimise the total number of connected components after the earthquake. Two islands are in the same connected component if and only if there exists a way to travel between them using only reinforced bridges. Can you help them?

Note: please read the Scoring section below.

Subtasks and Constraints

For all subtasks, you are guaranteed that:

- $1 \leq N \leq 10\,000$.
- $1 \leq E \leq 100\,000$.
- $1 \leq K \leq 5\,000$.
- $1 \leq X \leq 1\,000\,000\,000$.
- $1 \leq A_i \leq N$.
- $1 \leq B_i \leq N$.
- $A_i \neq B_i$, for all i.
- $1 \leq C_i \leq K$.
- $1 \leq D_i \leq X$.

In this problem, each subtask **only has one test case**. These test cases are available for download from the Attachments page.

Subtask	Points	Additional constraints
1	5	$N = 7$ and $E = 8$.
2	5	Between any two islands there is a unique path (sequence of bridges).
3	15	$K = 1$.
4	15	$B_i = N$, for all i. If $A_i = A_j$ then $D_i = D_j$, for all i, j.
5	15	$D_i = 1$, for all i. Each island is connected to at most two islands.
6	15	$D_i = 1$, for all i.
7	15	-
8	15	-

You are encouraged to look at the content of the test cases, and to experiment on your computer. Submitting a code which prints an hardcoded solution for one of the test cases **is** allowed.

Input

- The first line of input contains the four integers, N, E, K and X.
- Then, E lines follow. The i-th line contains the four integers A_i, B_i, C_i and D_i.

Output

Output a single line, containing up to E integers, the bridges that you would like to reinforce (in any order).

Scoring

If you:

- list the same bridge more than once, or
- output a number less than 1 or more than E, or
- spend too many dollars of any company,

then your score will be zero for that subtask.

Otherwise, your score will be a sliding scale based on how close your solution is to the optimal solution. Given two parameters INF and SUP, if the number of connected component after the earthquake is X, your score on this subtask will be:

$$min(100, max(0, 100 * (SUP - X)/(SUP - INF)))$$

Scoring parameters of each subtask are given in the table below:

Subtask	INF	SUP
1	1	4
2	382	1000
3	58	176
4	1	3
5	151	1000
6	1	1000
7	1	150
8	1	1100

Sample Input 1

```
10 11 8 1000
1 2 7 100
1 3 7 100
2 3 4 750
2 3 1 1000
4 3 4 750
4 5 3 600
5 6 3 601
5 6 3 602
6 4 3 603
```

```
4 6 3 604
7 8 3 100
```

Sample Output 1

```
2 4 5 7 11
```

Sample Input 2

```
4 5 5 12345
4 1 1 12345
1 2 2 12345
2 4 5 12345
4 3 2 12345
3 2 3 12345
```

Sample Output 2

```
1 2 3 5
```

Explanation

In Sample Case 1, each company has $X = 1000$ dollars to spend:

- Company 1 reinforces the 4th bridge, costing 1000 dollars.
- Company 3 reinforces the 7th and 11th bridges, costing $601 + 100 = 701$ dollars.
- Company 4 reinforces the 5th bridge, costing 750 dollars.
- Company 7 reinforces the 2nd bridge, costing 100 dollars.

This gives 5 connected components (two of those components are size 1).

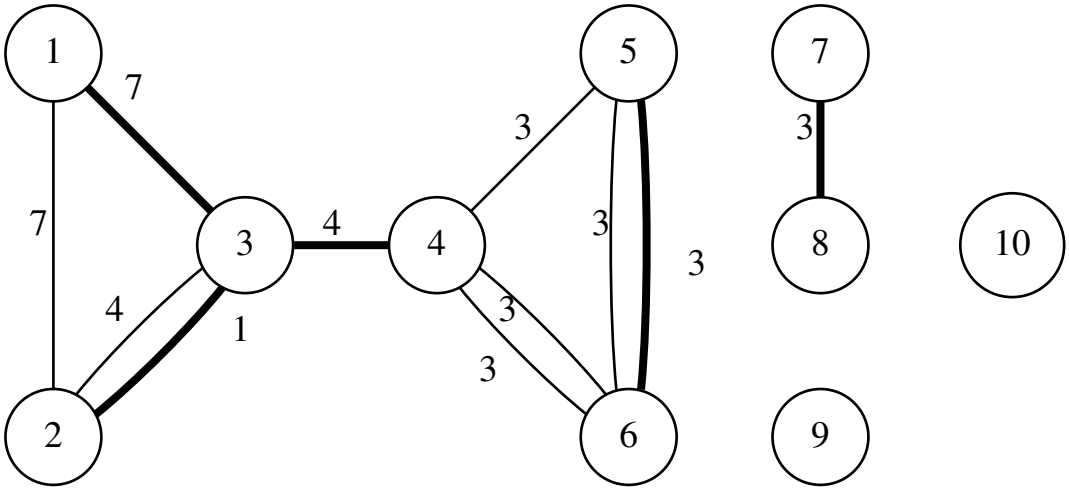

Figure 1: Sample Case 1

In Sample Case 2, each company has $X = 12345$ dollars to spend:

- Company 1 reinforces the 1st bridge, costing 12345 dollars.
- Company 2 reinforces the 2nd bridge, costing 12345 dollars.
- Company 3 reinforces the 5th bridge, costing 12345 dollars.
- Company 5 reinforces the 3rd bridge, costing 12345 dollars.

This gives 1 connected component.

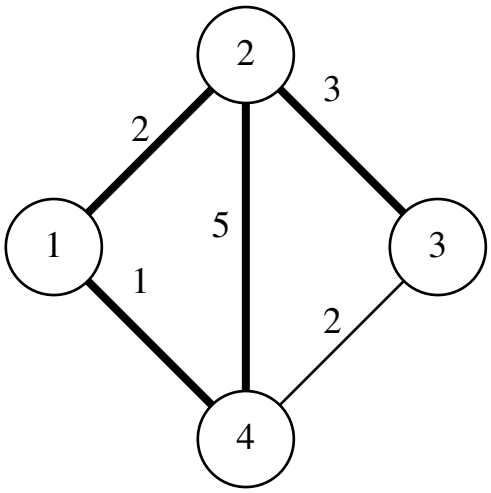

Figure 2: Sample Case 2