Problem H. Path

Input file:	standard input
Output file:	standard output
Time limit:	2 seconds
Memory limit:	256 megabytes

Given a graph with n vertices and m edges.Each vertex is numbered from 1 to n.

Each edge i has its cost w_i,some edges are common edges and some edges are special edges.

When you pass through a special edge, the next step after passing this edge,you can reach any vertex in the graph. if you goto the vertice which an original edge i can arrived from current vertice, the cost become $w_i - K(0 \leq w_i - K)$(if you used edge i), otherwise the cost will become 0(every vertice except the vertice which original edge can arrived from current vertice)

original edge includes all common edges and special edges.

Now you start at S,You need to calculate the minimum cost from the starting vertex to each vertex(If there is a situation where you cannot reach, please output "-1 ")

Input

Each test contains multiple test cases. The first line contains the number of test cases T. Description of the test cases follows.

The first line of each test case contains four integers n, m, S, K

The next m lines each line contains four integers x, y, w, t represent an directed edge connect x and y with cost w,$t = 0$ represents it's a common edge,$t = 1$ represents it's a special edge.

$1 \leq \sum m, \sum n \leq 10^6, 1 \leq x, y, S \leq n, 1 \leq w, K \leq 10^9$

$K \leq w_i (1 \leq i \leq m)$

Output

For each test case, print n integer in a line— the answer to the problem. There is a space at the end of the line for each line.when you cannot reach, please output -1.

Example

standard input	standard output
2 5 4 1 1 1 2 4 0 1 3 5 0 3 4 3 1 4 5 3 0 5 3 1 1 1 2 4 0 1 3 5 0 3 4 3 1	0 4 5 8 10 0 4 5 8 8