

Problem I. Interest

Input file: *standard input*
Output file: *standard output*
Time limit: 5 seconds
Memory limit: 512 mebibytes

Bitgard is a thriving metropolis. At this point, it has exactly n crossroads (numbered from 1, to n), connected by m one way roads. Each road has some non-negative length. The only point of road intersections are crossroads, though there may be many tunnels and viaducts. It is known that each crossroad is reachable from the crossroad number 1, but it doesn't have to be true, that each crossroad is reachable from any other crossroad.

Bitgard expands and get wealthy so quickly, that some people became interested in robbing it's facilities. Two of such individuals are Bolek and Lolek. To achieve their goal they moved to the crossroad number 1, and now they want to rob the shop nearby some other crossroad. If they decide to assault shop nearby the i -th crossroad, to minimize the risk of being associated with each other, they will go to this crossroad by two edge-separated paths. If such paths exist, Bolek and Lolek want to know the minimum sum of lengths of such paths.

For each crossroad other than the first one, help Bolek and Lolek to determine this value or state that this is impossible to find two such paths.

Input

In the first line one integer $Z \leq 100$ is given, denoting number of testcases described in following lines.

The first line of the test case contains two integers n and m , denoting the number crossroads and the number of one-way roads in Bitgard.

Each of the m following lines contains a description of roads. i -th line consists of three integer numbers a_i, b_i and c_i ($a_i \neq b_i \in [1, n], c \in [0, 10^9]$), denoting that there is road starting at crossroad a_i connecting it to crossroad number b_i , which has length c_i . You can assume that for each ordered pair of crossroads there is at most one road connecting them.

Sums over the values of parameters n and m over all test cases do not exceed 10^5 and 10^6 respectively.

Output

The first and only line of the output for each test case should consist of $n - 1$ (possibly zero) numbers denoting results for all the crossroads except from the first one. If it is possible to find two edge-disjoint paths from vertex 1 to vertex i , then i -th number should be equal to minimum length of sum of such paths. In other case you should output -1 for this crossroad.

Examples

| standard input | standard output |
|--|--------------------------|
| 3 3 4 1 2 1 1 3 2 2 3 3 3 2 4 2 2 1 2 1 2 1 0 5 7 1 2 4 2 3 3 1 3 8 3 5 3 4 5 2 5 4 7 1 5 1 | 7 6 -1 -1 15 -1 11 |
| 2 4 9 1 2 18 2 3 1 3 4 11 4 3 2 4 1 30 3 1 24 3 2 22 1 3 18 2 4 1 4 5 1 2 2 1 3 14 1 4 4 2 1 20 2 3 30 | 58 37 48 -1 46 -1 |