K-transfer journey

There are **N** cities numbered from 1 to N, connected by **M** flights. Note that a flight from city 1 to 2 doesn't necessarily mean there is a flight from 2 to 1, and some cities may not be connected by any flights. Also, there is at most one directed flight from one city to another one. The i-th flight connects city $\mathbf{U_i}$ with city $\mathbf{V_i}$, takes $\mathbf{W_i}$ seconds, plus a constraint: the current accumulated travel time cannot exceed $\mathbf{L_i}$ when you are in U_i and plan to go to V_i from there for health reason.

Duck wants to travel, but he will be very tired if he takes too many flights! Therefore, he doesn't want to take more than **K** flights. Can you find out the shortest travel time for all pairs of cities by not taking more than K flights and following the accumulated travel time constraint of each flight?

Input

The first line is the number of test cases **T**. $(1 \le T \le 20)$

For each test case, it starts with **N**, **M**, **K**. $(2 \le N \le 50,\ 0 \le M \le N \times (N - 1),\ 1 \le K \le N - 1)$

Following M lines, each consisting $\mathbf{U_i}$, $\mathbf{V_i}$, $\mathbf{W_i}$, $\mathbf{L_i}$. $(1 \le U_i, V_i \le N$ where $U_i \ne V_i$, $1 \le W_i \le 10^4$, $1 \le L_i \le 10^4 \times 50)$

Output

Output a N × N distance matrix, printing out the shortest travel time for all pairs of cities. If one city is not reachable from one city, print out -1 instead.

Example

Input:

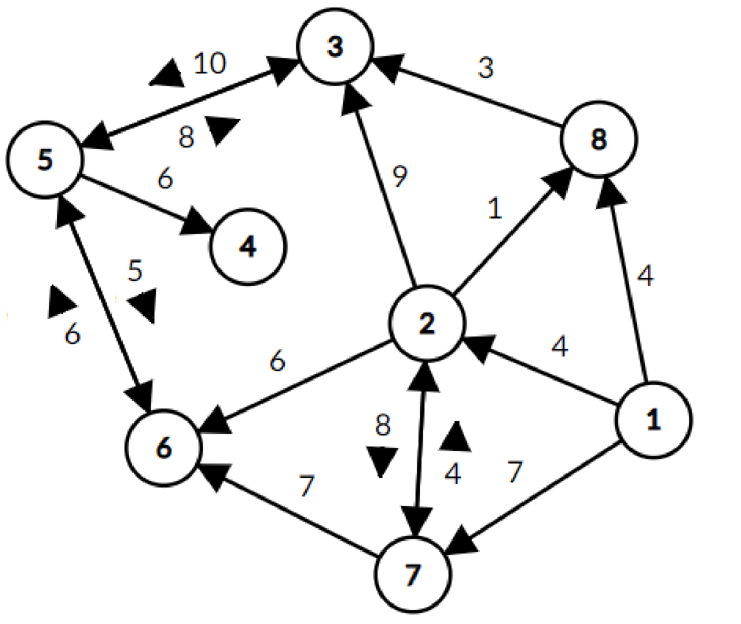
```
2
8 15 3
1 2 4 10
1 7 7 28
1 8 4 27
2 3 9 34
2 6 6 14
2 7 8 7
2 8 1 12
3 5 10 24
5 3 8 39
5 4 6 28
5 6 5 11
6 5 6 9
7 2 4 6
7 6 7 12
8 3 3 3

6 9 5
1 2 10 31
1 3 14 58
1 5 23 24
3 1 12 12
3 2 4 19
4 1 20 53
4 5 25 47
5 4 13 47
6 2 4 39
```

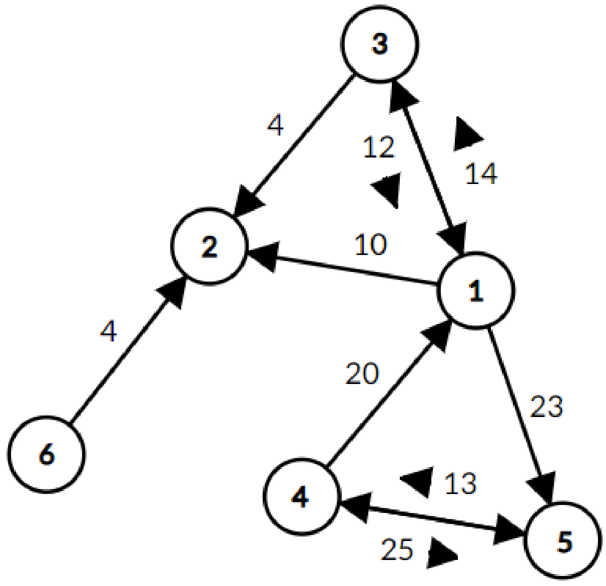
Output:

```
0 4 13 -1 23 10 7 4
-1 0 4 18 12 6 8 1
-1 -1 0 16 10 15 -1 -1
-1 -1 -1 0 -1 -1 -1 -1
-1 -1 8 6 0 5 -1 -1
-1 -1 14 12 6 0 -1 -1
-1 4 13 19 13 7 0 5
-1 -1 3 19 13 -1 -1 0
0 10 14 36 23 -1
-1 0 -1 -1 -1 -1
12 4 0 48 35 -1
20 30 34 0 25 -1
33 -1 47 13 0 -1
-1 4 -1 -1 -1 0
```

Explanation



Case #1



Case #2

Select some results to explain, won't go through all..

In case 1, 1 -> 3 is 13 through 2, rather than 7 through 8 because 1 -> 8 is 4, and 8 to 3 has a accumulated time constraint which is 3.
8 -> 6 is not reachable although there is exactly one path connecting them and within K, the constraint of 5 -> 6 is 11, which is larger than accumulated time of 13.

In case 2, 5 -> 2 is not reachable. Only one path connecting 5 to 1 which takes 33. From 1 -> 2 the shortest time is 10 but its constraint is 31 which is larger than 33. So we pass through 3 instead and the total time becomes 47. Unluckily the constraint of 3 -> 2 also limits the reachability.