Problem B. Baggage

Time limit: 3 seconds
Memory limit: 1024 megabytes

As an avid traveller, Bartek sets out each year to explore new countries and continents. He manages this by carefully optimizing his travel costs – a must when travelling with two suitcases. To save money, he relies on his friends to store his suitcases and stays in hotels paid for by organizers of local programming competitions.

There are n cities in the world (numbered from 1 to n) and m flight connections. Each flight connection is described by four numbers (a, b, c, d), representing a one-way flight from city a to city b with a cost of c and a limit of d suitcases. Bartek can use the same flight multiple times, each time bringing along at most d suitcases. The ticket price does not depend on the amount of luggage. A suitcase cannot travel alone on the plane, but in each city Bartek has a friend who might store any number of suitcases for any length of time and as many times as needed.

Bartek has two suitcases and wants to travel between two cities. For each of n^2 pairs of cities (x, y) find the minimum total travel cost if Bartek starts in city x with two suitcases and wants to arrive with them in city y. Output `-1` if it isn't possible for a given pair of cities.

Input

The first line contains two integers n and m ($1 \le n \le 400$; $0 \le m \le 500\,000$), denoting the number of cities and the number of flight connections.

Each of the following m lines contains four integers a_i, b_i, c_i, d_i ($1 \le a_i, b_i \le n$; $a_i \ne b_i$; $1 \le c_i \le 10^9$; $0 \le d_i \le 2$) describing one flight connection. There might be multiple connections from one city to another. It is possible that some cities have no outgoing or incoming connections.

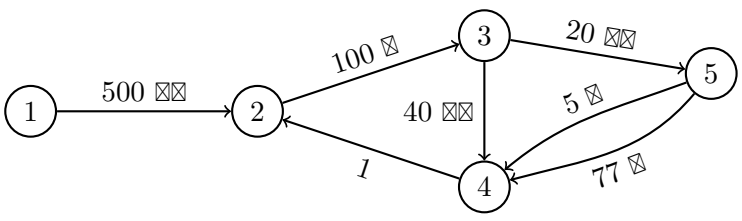
Output

Output n lines, each containing n integers separated by spaces. In the i-th line, the j-th integer should be the minimum total cost of travelling with two suitcases from city i to city j, or integer `-1` if it is not possible.

Example

standard input	standard output
5 7 1 2 500 2 2 3 100 1 3 5 20 2 5 4 5 1 4 2 1 0 3 4 40 2 5 4 77 1	0 500 726 751 746 -1 0 226 251 246 -1 -1 0 40 20 -1 -1 -1 0 -1 -1 -1 -1 131 0

Note



For example, from city 1 to city 3 Bartek can travel in the following way:

$1 \to 2$ (drop a suitcase) $\to 3$ (drop a suitcase) $\to 5 \to 4 \to 2$ (pick up a suitcase) $\to 3$ (pick up a suitcase)

The total cost is $500 + 100 + 20 + 5 + 1 + 100 = 726$.