

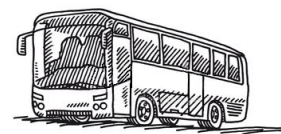


Task Autobus

In a country there are n cities. The cities are connected by m bus routes, where the i -th route starts in city a_i , ends in city b_i and takes t_i minutes.

Ema loves to travel, but doesn't like transferring between buses. On her trip she wants to use **at most** k different bus routes.

Help her answer q questions of the form 'What is the shortest travel time to get from city c_j to city d_j (using at most k different bus routes)?'.



Input

The first line contains two positive integers n and m ($2 \leq n \leq 70$, $1 \leq m \leq 10^6$), the number of cities and the number of bus routes.

The i -th of the next m lines contains positive integers a_i , b_i and t_i ($1 \leq a_i, b_i \leq n$, $1 \leq t_i \leq 10^6$), the terminal cities and the travel time of the i -th bus route.

The next line contains two positive integers k and q ($1 \leq k \leq 10^9$, $1 \leq q \leq n^2$), the maximum number of used routes and the number of queries.

The j -th of the next q lines contains positive integers c_j and d_j ($1 \leq c_j, d_j \leq n$), the cities from the j -th query.

Output

Print q lines. In the j -th line print the shortest travel time from the j -th query, or -1 if there is no trip that satisfies the requirements.

Scoring

Subtask	Points	Constraints
1	15	$k \leq n \leq 7$
2	15	$k \leq 3$
3	25	$k \leq n$
4	15	No additional constraints.



Examples

input

```
4 7
1 2 1
1 4 10
2 3 1
2 4 5
3 2 2
3 4 1
4 3 2
1 3
1 4
4 2
3 3
```

output

```
10
-1
0
```

input

```
4 7
1 2 1
1 4 10
2 3 1
2 4 5
3 2 2
3 4 1
4 3 2
2 3
1 4
4 2
3 3
```

output

```
6
4
0
```

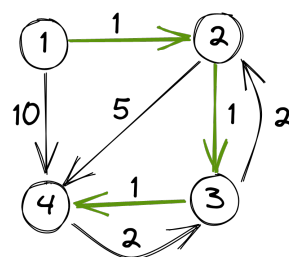
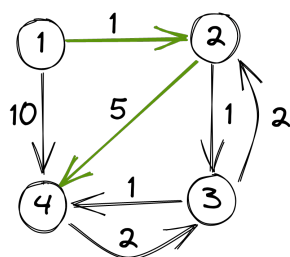
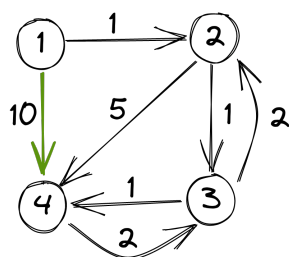
input

```
4 7
1 2 1
1 4 10
2 3 1
2 4 5
3 2 2
3 4 1
4 3 2
3 3
1 4
4 2
3 3
```

output

```
3
4
0
```

Clarification of the examples:



The answer to the first query from each example is marked on the graph.