Convex Hull

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes

You are travelling on a ship in an archipelago. The ship has a convex hull which is K centimetres thick. The archipelago has N islands, numbered from 1 to N. There are M sea routes amongst them, where the i-th route runs directly between two different islands a_i and b_i ($1 \leq a_i, b_i \leq N$), takes t_i minutes to travel along in either direction, and has rocks that wear down the ship's hull by h_i centimetres. There may be multiple routes running between a pair of islands.

You would like to travel from island A to a different island B ($1 \leq A, B \leq N$) along a sequence of sea routes, such that your ship's hull remains intact – in other words, such that the sum of the routes' h_i values is strictly less than K.

Additionally, you are in a hurry, so you would like to minimize the amount of time necessary to reach island B from island A. It may not be possible to reach island B from island A, however, either due to insufficient sea routes or having the ship's hull wear out.

Input

The first line of input contains three integers K, N and M ($1 \leq K \leq 200$, $2 \leq N \leq 2\,000$, $1 \leq M \leq 10\,000$), each separated by one space. The next M lines each contain 4 integers $a_i\,b_i\,t_i$ and h_i ($1 \leq a_i, b_i \leq N, 1 \leq t_i \leq 10^5, 0 \leq h_i \leq 200$), each separated by one space. The i-th line in this set of M lines describes the i-th sea route (which runs from island a_i to island b_i, takes t_i minutes and wears down the ship's hull by h_i centimetres). Notice that $a_i \neq b_i$ (that is, the ends of a sea route are distinct islands).

The last line of input contains two integers A and B ($1 \leq A, B \leq N; A \neq B$), the islands between which we want to travel.

Output

Output a single integer: the integer representing the minimal time required to travel from A to B without wearing out the ship's hull, or -1 to indicate that there is no way to travel from A to B without wearing out the ship's hull.

Scoring

Subtask 1 (25 points): $N \leq 50$.

Subtask 2 (25 points): $K = 1$.

Subtask 3 (50 points): No further constraints.

Examples

standard input	standard output
10 4 7 1 2 4 4 1 3 7 2 3 1 8 1 3 2 2 2 4 2 1 6 3 4 1 1 1 4 6 12 1 4	7
3 3 3 1 2 5 1 3 2 8 2 1 3 1 3 1 3	-1

Note

In the first example given above, the path of length 1 from 1 to 4 would wear out the hull of the ship. The three paths of length 2 ($[1, 2, 4]$ and $[1, 3, 4]$ two different ways) take at least 8 minutes. The path $[1, 2, 3, 4]$ takes 7 minutes and only wears down the hull by 7 centimetres, whereas the path $[1, 3, 2, 4]$ takes 13 minutes and wears down the hull by 5 centimetres.

In the second example, the direct path $[1, 3]$ wears down the hull to 0, as does the path $[1, 2, 3]$.