Roaa ElRay
20210571

Problem A.

Input file:	`standard input`
Output file:	`standard output`
Time limit:	3 seconds
Memory limit:	256 megabytes

Given a graph with n nodes and m weighted edges, find the shortest path from node a to node b, or state if no such path exists.

Input

The first line contains a single integer t $(1 \le t \le 55)$ denoting the number of test cases.

The first line of each test case contains four space-separated integers n, m, a and b $(1 \le m \le min(\frac{n(n-1)}{2}, 10^5))$ $(1 \le a, b \le n)$

The next m lines of each test case, each contains three space-separated integers u, v and c $(1 \le u, v \le n)$ $(1 \le c \le 1000)$ which means there is an undirected edge from node u to node v with weight of c.

Output

For each test case, print a single integer — the length of the minimum path from node a to node b or -1 if there is no such path.

Scoring

Sub task #1 (30 points): $(2 \le n \le 10^2)$

Sub task #2 (30 points): $(1 \le n \le 10^3)$

Sub task #3 (40 points): $(1 \le n \le 10^5)$

Example

standard input	standard output
3 3 2 1 3 1 2 5 2 3 7 3 3 1 3 1 2 4 1 3 7 2 3 1 3 1 1 3 1 2 4	12 5 -1

Problem C.

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

Given a directed graph consisting of n nodes and m directed weighted edges, where the graph is rooted at node with id 1, your task is to determine the shortest path from the root to all other nodes within the graph. or determine if there is a negative cycle.

Input

The first line contains a single integer t $(1 \leq t \leq 55)$ denoting the number of test cases.

The first line of each test case contains three space-separated integers n and m $(1 \leq m \leq min(n^2, 10^5))$

The next m lines of each test case, each contains three space-separated integers u, v and c $(1 \leq u, v \leq n)$ $(-1000 \leq c \leq 1000)$ which means there is a directed edge from node u to node v with weight of c.

Output

For each test case, If there is a negative cycle print INF. otherwise, print a single integer denoting the minimum cost you can achieve.

Scoring

Sub task #1 (40 points): $(1 \leq n \leq 100)$

Sub task #2 (60 points): $(1 \leq n \leq 1000)$

Example

standard input	standard output
4 5 5 1 2 -4 1 3 5 3 4 -20 4 5 2 5 3 -1 5 5 1 2 -4 1 3 5 3 4 -20 4 5 2 2 5 -1 5 5 1 2 4 1 3 5 3 4 20 4 5 -2 2 5 -1 4 3 1 4 -1 4 3 -1 3 2 -1	INF -15 0 -3

Problem D.

Input file:	standard input
Output file:	standard output
Time limit:	2 seconds
Memory limit:	256 megabytes

Given an array a of size n, a range $[l, r]$, and a value k, find all subsequences within the indices l to r whose sum is exactly k.

†A sequence b is a subsequence of array a if b can be obtained from a by the deletion of several (possibly zero, but not all) elements.

Input

The first line contains a single integer t $(1 \le t \le 55)$ denoting the number of test cases.

The first line of each test case contains four space-separated integers n, l, r and k $(1 \le l \le r \le n)$, $(1 \le k \le 10^{12})$

The second line of each test case contains n space separated integers a_i $(1 \le a_i \le 10^9)$ denoting the value of each array element.

Output

For each test case, print a single integer – the number of subsequences from l to r whose sum is exactly equals to k

Scoring

Sub task #1 (60 points): $(1 \le n \le 18)$

Sub task #2 (40 points): $(1 \le n \le 34)$

Example

standard input	standard output
3 6 2 5 16 2 8 4 8 4 13 6 1 6 5 1 2 3 4 5 4 4 2 3 1 2 1 1 2	3 4 2

Problem E.

Input file:	standard input
Output file:	standard output
Time limit:	3 seconds
Memory limit:	256 megabytes

Given an undirected graph consisting of n nodes and m weighted undirected edges, your task is to determine the minimum cost required to traverse the entire graph. To enhance connectivity within the graph, you are allowed to add any number of additional edges between any two nodes. Each added edge has a fixed weight of k. The cost of traversing the graph is defined as the sum of the weights of the edges used in the traversal. The goal is to ensure that all nodes are connected directly or indirectly, minimizing the total cost of the edges used.

Input

The first line contains a single integer t $(1 \leq t \leq 55)$ denoting the number of test cases.

The first line of each test case contains three space-separated integers n, m, and k $(1 \leq m \leq min(\frac{n(n-1)}{2}, 10^5))$ $(1 \leq k \leq 1000)$

The next m lines of each test case, each contains three space-separated integers u, v and c $(1 \leq u, v \leq n)$ $(1 \leq c \leq 1000)$ which means there is an undirected edge from node u to node v with weight of c.

Output

For each test case, print a single integer – the minimum cost to traverse the graph.

Scoring

Sub task #1 (20 points): $(1 \leq n \leq 10^3)$

Sub task #2 (30 points): $(1 \leq n \leq 10^4)$

Sub task #3 (50 points): $(1 \leq n \leq 10^5)$

Example

standard input	standard output
2 4 5 1 1 2 13 2 3 5 1 3 3 4 2 23 4 3 21 4 3 14 1 3 13 4 2 6 4 3 6	3 25

Problem B.

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

Given a graph with n nodes and m weighted edges, and q queries, where each query contains two integers a_i and b_i, find the shortest path from node a_i to b_i for each query or state if no such path exists.

Input

The first line contains three space-separated integers n m and q $(1 \leq m \leq min(\frac{n(n-1)}{2}, 10^5))$ – the number of nodes and the number of edges respectively.

The next m lines each contains three space-separated integers u, v and c $(1 \leq u, v \leq n)$ $(1 \leq c \leq 1000)$ which means there is an undirected edge from node u to node v with weight of c.

The next q lines each contains two space-separated integers a_i and b_i $(1 \leq a_i, b_i \leq n)$.

Output

For each query, print a single integer – the length of the minimum path from node a_i to node b_i or -1 if there is no such path.

Scoring

Sub task #1 (20 points): $(2 \leq n \leq 50)$ $(1 \leq q \leq 10^2)$

Sub task #2 (20 points): $(2 \leq n \leq 100)$ $(1 \leq q \leq 10^3)$

Sub task #3 (20 points): $(2 \leq n \leq 200)$ $(1 \leq q \leq 10^4)$

Sub task #4 (40 points): $(2 \leq n \leq 500)$ $(1 \leq q \leq 10^5)$

Example

<table>
<tr><th>standard input</th><th>standard output</th></tr>
<tr><td><pre>5 6
1 2 5
1 3 2
1 4 4
2 3 3
2 4 4
3 4 1
5
1 2
1 4
2 3
3 4
1 5</pre></td><td><pre>5
3
3
1
-1</pre></td></tr>
</table>

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