E - Development

Editorial (/contests/abc416/tasks/abc416_e/editorial)

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Time Limit: 3.5 sec / Memory Limit: 1024 MiB

Score : 450 points

Problem Statement

AtCoder Country has N cities numbered from 1 to N, M roads, and K airports.

The i-th road connects cities A_i and B_i bidirectionally and takes C_i hours to travel. There are airports in cities $D_1, \ldots, D_K$, and you can travel between cities with airports in T hours.

Process Q queries in order. Each query is one of the following three types:

- `1 x y t`: A road connecting cities x and y bidirectionally in t hours is built.
- `2 x`: An airport is built in city x.
- `3`: Let $f(x, y)$ be the smallest number of hours needed to reach city y from city x using roads and airports if reachable, and 0 if unreachable. Find $\sum_{x=1}^{N} \sum_{y=1}^{N} f(x, y)$.

Constraints

- $1 \leq N \leq 500$
- $0 \leq M \leq 10^5$
- $1 \leq A_i < B_i \leq N$
- $1 \leq C_i \leq 10^9$
- $0 \leq K \leq N$
- $1 \leq T \leq 10^9$
- $1 \leq D_1 < \cdots < D_K \leq N$

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- $1 \leq Q \leq 1000$
- For type 1 queries: $1 \leq x < y \leq N, 1 \leq t \leq 10^9$.
- For type 2 queries: $1 \leq x \leq N$.
- All input values are integers.

Input

The input is given from Standard Input in the following format:

$$
\begin{aligned}
&N \quad M \\
&A_1 \quad B_1 \quad C_1 \\
&\vdots \\
&A_M \quad B_M \quad C_M \\
&K \quad T \\
&D_1 \quad \dots \quad D_K \\
&Q \\
&\mathrm{Query}_1 \\
&\vdots \\
&\mathrm{Query}_Q
\end{aligned}
$$

Query_i represents the i-th query, whose format and meaning are as given in the problem statement.

Output

Output the answers to type 3 queries in order, separated by newlines.

Sample Input 1 Copy

```
4 1
1 2 10
2 100
1 3
5
3
1 2 3 60
3
2 4
3
```

Sample Output 1 Copy

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```
440
280
900
```

Copy

AtCoder Country has four cities. Initially, there is a road connecting cities 1 and 2 in 10 hours, and airports connecting cities 1 and 3 in 100 hours.

- Initially, $f(1,2) = f(2,1) = 10$, $f(1,3) = f(3,1) = 100$, $f(2,3) = f(3,2) = 110$, and others are 0, so $\sum_{x=1}^{N} \sum_{y=1}^{N} f(x,y) = 440$.
- A new road connecting cities 2 and 3 in 60 hours is built.
- $f(1,2) = f(2,1) = 10$, $f(1,3) = f(3,1) = 70$, $f(2,3) = f(3,2) = 60$, and others are 0, so $\sum_{x=1}^{N} \sum_{y=1}^{N} f(x,y) = 280$.
- A new airport is built in city 4.
- $f(1,2) = f(2,1) = 10$, $f(1,3) = f(3,1) = 70$, $f(1,4) = f(4,1) = 100$, $f(2,3) = f(3,2) = 60$, $f(2,4) = f(4,2) = 110$, $f(3,4) = f(4,3) = 100$, and others are 0, so $\sum_{x=1}^{N} \sum_{y=1}^{N} f(x,y) = 900$.

Multiple roads may exist between some pair of cities. Also, a city may have multiple airports.

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