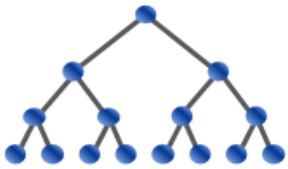
USA Computing Olympiad



USACO 2023 January Contest, Platinum
Problem 2. Mana Collection

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Time Remaining: **3 hrs, 58 min, 24 sec**

Not submitted yet

English (en)

Note: The time limit for this problem is 5s, 2.5 times the default. The memory limit for this problem is 512MB, twice the default.

Bessie has recently taken an interest in magic and needs to collect mana for a very important spell. Bessie has N ($1 \le N \le 18$) mana pools, the ith of which accumulates m_i mana per second ($1 \le m_i \le 10^8$). The pools are linked by a collection of M ($0 \le M \le N(N-1)$) directed edges (a_i, b_i, t_i), meaning that she can travel from a_i to b_i in t_i seconds ($1 \le a_i, b_i \le N$, $a_i \ne b_i$, $1 \le t_i \le 10^9$). Whenever Bessie is present at a pool, she can collect all the mana stored at that location, emptying it. At time 0, all mana pools are empty, and Bessie can select any pool to start at.

Answer Q ($1 \le Q \le 2 \cdot 10^5$) queries, each specified by two integers s and e ($1 \le s \le 10^9$, $1 \le e \le N$). For each query, determine the maximum amount of mana Bessie can collect in s seconds if she must be at mana pool e at the end of the sth second.

INPUT FORMAT (input arrives from the terminal / stdin):

First line contains N and M.

Next line contains $m_1, m_2, \ldots, m_N$.

Next M lines contain a_i, b_i, t_i. No ordered pair (a_i, b_i) appears more than once in the input.

Next line contains Q.

Next Q lines contain two integers s and e.

OUTPUT FORMAT (print output to the terminal / stdout):

Q lines, one for each query.

SAMPLE INPUT:

```
2 1
1 10
1 2 10
4
5 1
5 2
100 1
100 2
```

SAMPLE OUTPUT:

```
5
50
100
1090
```

First query: Bessie takes 5 mana from pool 1 after 5 seconds.

Second query: Bessie takes 50 mana from pool 2 after 5 seconds.

Third query: Bessie takes 100 mana from pool 1 after 100 seconds.

Fourth query: Bessie takes 90 mana from pool 1 after 90 seconds and 1000 mana from pool 2 after 100 seconds.

SAMPLE INPUT:

```
4 8
50000000 100000000 20000000 70000000
1 2 20
2 1 50
2 3 90
1 3 40
```

```
3 1 10
4 1 25
1 4 5
4 3 70
3
8 3
1000000000 1
500000 4
```

SAMPLE OUTPUT:

```
160000000
239999988050000000
119992550000000
```

An example where Bessie is able to collect much larger amounts of mana.

SCORING:

- Inputs 3-4: $N \leq 10, Q \leq 100$
- Inputs 5-9: $N \leq 10$
- Inputs 10-14: $Q \leq 100$
- Inputs 15-17: $N = 16$
- Inputs 18-20: $N = 17$
- Inputs 21-24: No additional constraints.

Problem credits: Benjamin Qi

Language: C

Source File: 选择文件 未选择任何文件

Submit Solution