C. Cloud Computing

time limit per test 3 seconds
memory limit per test 256 megabytes
input standard input
output standard output

Buber is a Berland technology company that specializes in waste of investor's money. Recently Buber decided to transfer its infrastructure to a cloud. The company decided to rent CPU cores in the cloud for n consecutive days, which are numbered from 1 to n. Buber requires k CPU cores each day.

The cloud provider offers m tariff plans, the i-th tariff plan is characterized by the following parameters:

- l_i li and r_i ri — the i-th tariff plan is available only on days from l_i to r_i, inclusive,
- c_i ci — the number of cores per day available for rent on the i-th tariff plan,
- p_i pi — the price of renting one core per day on the i-th tariff plan.

Buber can arbitrarily share its computing core needs between the tariff plans. Every day Buber can rent an arbitrary number of cores (from 0 to c_i ci) on each of the available plans. The number of rented cores on a tariff plan can vary arbitrarily from day to day.

Find the minimum amount of money that Buber will pay for its work for n days from 1 to n. If on a day the total number of cores for all available tariff plans is strictly less than k, then this day Buber will have to work on fewer cores (and it rents all the available cores), otherwise Buber rents exactly k cores this day.

Input

The first line of the input contains three integers n, k and m ($1 \le n, k \le 10^6, 1 \le m \le 2 \cdot 10^5$ 1≤n,k≤106,1≤m≤2·105) — the number of days to analyze, the desired daily number of cores, the number of tariff plans.

The following m lines contain descriptions of tariff plans, one description per line. Each line contains four integers l_i li, r_i ri, c_i ci, p_i pi ($1 \le l_i \le r_i \le n$ 1≤li≤ri≤n, $1 \le c_i, p_i \le 10^6$ 1≤ci,pi≤106), where l_i li and r_i riare starting and finishing days of the i-th tariff plan, c_i ci — number of cores, p_i pi — price of a single core for daily rent on the i-th tariff plan.

Output

Print a single integer number — the minimal amount of money that Buber will pay.

Examples

input Copy

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

output Copy

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44
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input Copy

```
7 13 5
2 3 10 7
3 5 10 10
1 2 10 6
4 5 10 9
3 4 10 8
```

output Copy

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462
```

input Copy

```
4 100 3
3 3 2 5
1 1 3 2
2 4 4 4
```

output Copy

```
64
```