Natpro2020 - 01 - Upiti nad intervalima

A. Vječni student

time limit per test: 8 seconds
memory limit per test: 64 megabytes
input: standard input
output: standard output

Godina je 2079. i Perica još uvijek studira. Više nije na FER2 programu, ni na FER3 programu, već na programu FERN.

Trenutno se pred konzumom s vršnjacima raspravlja o tome koji su studijski programi FER-a bili najbolji.

Za nastavni program FERi, Perica i prijatelji procjenili su kvalitetu brojem k_i.

Između nekih programa odlučili su da je "najbolji" onaj koji ima drugu najvišu kvalitetu. (Ako je kvaliteta previsoka, odjednom postane vrlo teško uopće se upisati. Zato je drugi po redu bolji.)

Nakon toga slijedi Q događaja. Ili netko u grupici kaže "$1\ l\ r$", što znači da ga zanima kolika je bila kvaliteta najboljeg studijskog programa u intervalu [FERl, FERr], ili pak Perica kaže "$2\ x\ y$", što znači da se predomislio i da kvaliteta programa FERx zapravo iznosi y.

Pomozite našem heroju Perici odgovoriti na sva pitanja, kako bi ispao najpametniji među prijateljima!

Input
U prvom redu su dva broja, N i Q. ($1 \leq N, Q \leq 500000$)

U drugom redu nalazi se niz brojeva $k_1, k_2, \ldots, k_n$: početne kvalitete studijskih programa FER-a. ($0 \leq k_i \leq 10^9$)

U slijedećih Q redaka nalaze se događaji. Svaki događaj je u jednom od dva oblika:

$*\ 1\ l\ r$ ($1 \leq l \leq r \leq n$)

$*\ 2\ x\ y$ ($1 \leq x \leq n$, $0 \leq y \leq 10^9$)

Output
Redom za svako pitanje u svoj zaseban red ispišite odgovor: kvalitetu najboljeg studijskog programa u traženom trenutku.

Example

input Copy

```
5 9
3 2 1 3 2
1 1 3
1 1 5
1 3 4
2 3 4
1 1 3
1 1 5
1 3 4
1 4 5
1 1 2
```

output Copy

```
2
3
1
3
3
3
2
2
```

B. Sunčica

time limit per test: 8 seconds
memory limit per test: 64 megabytes
input: standard input
output: standard output

Sunčica je od malih nogu bila entuzijast za klimu. Budući da je čovječanstvo odavno nastanilo razne planete mliječne staze, Sunčica je svoju apsolventsku godinu odlučila odraditi na planetu I.

Planet I oblika je slova I, samo jaaaako izduljen. Podijeljen je na susjedne sektore, označene brojevima 1 do N.

Zvijezda planeta I ponaša se poprilično čudno. U njoj se događaju reakcije koje mijenjaju temperaturu u sektorima $[L, R]$ za v.

Sunčica opaža ove promjene, i želi znati temperaturu određenog sektora u nekom trenutku.

Postavljeni su upiti 2 različita tipa. Upit "$1\ l\ r\ v$" znači "Svim sektorima indeka u intervalu $[l, r]$ se temperatura promijenila za v. Upit "$2\ x$" označava da Sunčicu zanima temperatura sektora x nakon prethodno opaženih promjena.

Odgovorite na Sunčicine upite tipa 2!

Input
U prvom redu su dva broja, N i Q. ($1 \leq N, Q \leq 500000$)

U drugom redu nalazi se niz brojeva $t_1, t_2, \ldots, t_n$: početne temperature sektora. ($0 \leq t_i \leq 10^9$)

U slijedećih Q redaka nalaze se upiti. Svaki upit je u jednom od dva oblika:

$*\ 1\ l\ r\ v$ ($1 \leq l \leq r \leq n, -10^9 \leq v \leq 10^9$)

$*\ 2\ x$ ($1 \leq x \leq n$)

Output
Redom za svako pitanje u svoj zaseban red ispišite odgovor: temperaturu traženog sektora u traženom trenutku.

Example

input Copy

```
5 12
1 2 3 4 5
1 2 4 -2
2 1
2 2
2 3
2 4
2 5
1 1 3 3
2 1
2 2
2 3
2 4
2 5
```

output Copy

```
1
0
1
2
5
4
3
4
2
5
```

C. Lecture Sleep

time limit per test: 1 second
memory limit per test: 256 megabytes
input: standard input
output: standard output

Your friend Mishka and you attend a calculus lecture. Lecture lasts n minutes. Lecturer tells a_i theorems during the i-th minute.

Mishka is really interested in calculus, though it is so hard to stay awake for all the time of lecture. You are given an array t of Mishka's behavior. If Mishka is asleep during the i-th minute of the lecture then t_i will be equal to 0, otherwise it will be equal to 1. When Mishka is awake he writes down all the theorems he is being told — a_i during the i-th minute. Otherwise he writes nothing.

You know some secret technique to keep Mishka awake for k minutes straight. However you can use it **only once**. You can start using it at the beginning of any minute between 1 and $n - k + 1$. If you use it on some minute i then Mishka will be awake during minutes j such that $j \in [i, i + k - 1]$ and will write down all the theorems lecturer tells.

You task is to calculate the maximum number of theorems Mishka will be able to write down if you use your technique **only once** to wake him up.

Input

The first line of the input contains two integer numbers n and k ($1 \le k \le n \le 10^5$) — the duration of the lecture in minutes and the number of minutes you can keep Mishka awake.

The second line of the input contains n integer numbers $a_1, a_2, \dots a_n$ ($1 \le a_i \le 10^4$) — the number of theorems lecturer tells during the i-th minute.

The third line of the input contains n integer numbers $t_1, t_2, \dots t_n$ ($0 \le t_i \le 1$) — type of Mishka's behavior at the i-th minute of the lecture.

Output

Print only one integer — the maximum number of theorems Mishka will be able to write down if you use your technique **only once** to wake him up.

Example

input Copy

```
6 3
1 3 5 2 5 4
1 1 0 1 0 0
```

output Copy

```
16
```

Note

In the sample case the better way is to use the secret technique at the beginning of the third minute. Then the number of theorems Mishka will be able to write down will be equal to 16.

D. Knight Tournament

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

Hooray! Berl II, the king of Berland is making a knight tournament. The king has already sent the message to all knights in the kingdom and they in turn agreed to participate in this grand event.

As for you, you're just a simple peasant. There's no surprise that you slept in this morning and were late for the tournament (it was a weekend, after all). Now you are really curious about the results of the tournament. This time the tournament in Berland went as follows:

- There are n knights participating in the tournament. Each knight was assigned his unique number — an integer from 1 to n.
- The tournament consisted of m fights, in the i-th fight the knights that were still in the game with numbers at least l_i and at most r_i have fought for the right to continue taking part in the tournament.
- After the i-th fight among all participants of the fight only one knight won — the knight number x_i, he continued participating in the tournament. Other knights left the tournament.
- The winner of the last (the m-th) fight (the knight number x_m) became the winner of the tournament.

You fished out all the information about the fights from your friends. Now for each knight you want to know the name of the knight he was conquered by. We think that the knight number b was conquered by the knight number a, if there was a fight with both of these knights present and the winner was the knight number a.

Write the code that calculates for each knight, the name of the knight that beat him.

Input

The first line contains two integers n, m ($2 \le n \le 3 \cdot 10^5$; $1 \le m \le 3 \cdot 10^5$) — the number of knights and the number of fights. Each of the following m

lines contains three integers l_i, r_i, x_i $(1 \le l_i < r_i \le n; l_i \le x_i \le r_i)$ — the description of the i-th fight.

It is guaranteed that the input is correct and matches the problem statement. It is guaranteed that at least two knights took part in each battle.

Output

Print n integers. If the i-th knight lost, then the i-th number should equal the number of the knight that beat the knight number i. If the i-th knight is the winner, then the i-th number must equal 0.

Examples

input Copy

```
4 3
1 2 1
1 3 3
1 4 4
```

output Copy

```
3 1 4 0
```

input Copy

```
8 4
3 5 4
3 7 6
2 8 8
1 8 1
```

output Copy

```
0 8 4 6 4 8 6 1
```

Note

Consider the first test case. Knights 1 and 2 fought the first fight and knight 1 won. Knights 1 and 3 fought the second fight and knight 3 won. The last fight was between knights 3 and 4, knight 4 won.

E. Greg and Array

time limit per test: 1.5 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

Greg has an array $a = a_1, a_2, ..., a_n$ and m operations. Each operation looks as: $l_i, r_i, d_i, (1 \le l_i \le r_i \le n)$. To apply operation i to the array means to increase all array elements with numbers $l_i, l_i + 1, ..., r_i$ by value d_i.

Greg wrote down k queries on a piece of paper. Each query has the following form: $x_i, y_i, (1 \le x_i \le y_i \le m)$. That means that one should apply operations with numbers $x_i, x_i + 1, ..., y_i$ to the array.

Now Greg is wondering, what the array a will be after all the queries are executed. Help Greg.

Input

The first line contains integers n, m, k $(1 \le n, m, k \le 10^5)$. The second line contains n integers: $a_1, a_2, ..., a_n$ $(0 \le a_i \le 10^5)$ — the initial array.

Next m lines contain operations, the operation number i is written as three integers: $l_i, r_i, d_i, (1 \le l_i \le r_i \le n), (0 \le d_i \le 10^5)$.

Next k lines contain the queries, the query number i is written as two integers: $x_i, y_i, (1 \le x_i \le y_i \le m)$.

The numbers in the lines are separated by single spaces.

Output

On a single line print n integers $a_1, a_2, ..., a_n$ — the array after executing all the queries. Separate the printed numbers by spaces.

Please, do not use the `%lld` specifier to read or write 64-bit integers in C++. It is preferred to use the `cin`, `cout` streams of the `%I64d` specifier.

Examples

input Copy

```
3 3 3
1 2 3
1 2 1
1 3 2
2 3 4
1 2
1 3
2 3
```

output Copy

```
9 18 17
```

input Copy

```
1 1 1
1
1 1 1
1 1
```

output Copy

```
2
```

input Copy

```
4 3 6
1 2 3 4
1 2 1
2 3 2
3 4 4
1 2
1 3
2 3
1 2
1 3
2 3
```

output Copy

```
5 18 31 20
```