A - Scary Fee

Time Limit: 2 sec / Memory Limit: 1024 MiB

Score : 150 points

Problem Statement

You have a bankbook from The Terrifying Bank. The deposit passbook of the bank has a terrifyingly scary property that the commission fee changes according to the withdrawal amount.

To withdraw money from the passbook, you need to specify the withdrawal amount in units of $1\,000$ yen, and pay a commission fee of C yen per $1\,000$ yen of withdrawal amount separately from the balance. Withdrawals are not allowed if they would leave the balance below 0 yen.

When the balance of your passbook from the bank is X yen, what is the maximum amount of money you can withdraw from it?

Constraints

- $1 \le X \le 10^7$
- $1 \le C \le 999$
- All input values are integers.

Input

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

$X \quad C$

Output

Output the answer.

Sample Input 1

```
650000 8
```

Sample Output 1

```
644000
```

The commission fee required to withdraw $644\,000$ yen is $644\,000 \times \frac{8}{1000} = 5\,152$ yen, so since $644\,000 + 5\,152 \le 650\,000$, you can withdraw $644\,000$ yen.

On the other hand, the commission fee required to withdraw $645\,000$ yen is $645\,000 \times \frac{8}{1000} = 5\,160$ yen, so since $645\,000 + 5\,160 > 650\,000$, you cannot withdraw $645\,000$ yen.

Sample Input 2

```
1003 4
```

Sample Output 2

```
0
```

It is possible that no money can be withdrawn at all.

Sample Input 3

```
10000000 24
```

Sample Output 3

```
9765000
```

B - Locked Rooms

Time Limit: 2 sec / Memory Limit: 1024 MiB

Score : 200 points

Problem Statement

There are $N+1$ rooms arranged in a line, numbered $0, 1, \ldots, N$ in order.

Between the rooms, there are N doors numbered $1, 2, \ldots, N$. Door i is between rooms $i-1$ and i.

For each door, a value L_i representing the lock state is given. When $L_i = 0$, door i is unlocked, and when $L_i = 1$, door i is locked.

There are two people, one in room 0 and the other in room N. Each person can move between rooms $i-1$ and i only when door i is unlocked.

Find the number of rooms that neither of the two people can reach.

Constraints

- $2 \leq N \leq 100$
- $L_i \in \{0, 1\}$
- All input values are integers.

Input

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

$$N$$
$$L_1 \quad L_2 \quad \ldots \quad L_N$$

Output

Output the answer.

Sample Input 1

```
5
0 1 0 0 1
```

Sample Output 1

```
3
```

The rooms that neither of the two people can reach are rooms $2, 3, 4$, which is 3 rooms.

Sample Input 2

```
3
1 0 1
```

Sample Output 2

```
2
```

Sample Input 3

```
8
0 0 1 1 0 1 0 0
```

Sample Output 3

```
3
```

C - Lock All Doors

Time Limit: 2 sec / Memory Limit: 1024 MiB

Score : 300 points

Problem Statement

There are $N+1$ rooms arranged in a line, numbered $0, 1, \ldots, N$ in order.

Between the rooms, there are N doors numbered $1, 2, \ldots, N$. Door i is between rooms $i-1$ and i.

For each door, a value L_i representing the lock state is given. When $L_i = 0$, door i is unlocked, and when $L_i = 1$, door i is locked.

Takahashi is initially in room R, and can move between rooms $i-1$ and i only when door i is unlocked. Also, he can perform a **switching operation** on door i only when he is in room $i-1$ or room i. When a switching operation is performed on door i, if the door is unlocked, it becomes locked, and if it is locked, it becomes unlocked.

Find the minimum number of switching operations needed to make all doors locked.

Constraints

- $2 \leq N \leq 2 \times 10^5$
- $0 \leq R \leq N$
- $L_i \in \{0, 1\}$
- All input values are integers.

Input

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

$$
\begin{array}{l}
N \quad R \\
L_1 \quad L_2 \quad \ldots \quad L_N
\end{array}
$$

Output

Output the answer.

Sample Input 1

```
6 3
1 0 0 1 0 0
```

Sample Output 1

```
6
```

Takahashi can make all doors locked with six switching operations by acting as follows:

- Move to room 2.
- Perform a switching operation on door 2 to lock door 2.
- Move to room 3.
- Perform a switching operation on door 4 to unlock door 4.
- Perform a switching operation on door 3 to lock door 3.
- Move to room 4.
- Perform a switching operation on door 4 to lock door 4.
- Move to room 5.
- Perform a switching operation on door 5 to lock door 5.
- Perform a switching operation on door 6 to lock door 6.

Sample Input 2

```
2 1
0 0
```

Sample Output 2

```
2
```

Sample Input 3

```
8 2
0 1 0 0 1 0 1 1
```

Sample Output 3

```
8
```

D - Long Waiting

Time Limit: 2 sec / Memory Limit: 1024 MiB

Score : 400 points

Problem Statement

There is a restaurant that can accommodate at most K customers simultaneously. In front of this restaurant, there is a side street where one queue is managed.

At time 0, there are no customers in the restaurant, and the queue is also empty.

Today, N groups of customers are scheduled to come, and they are numbered from 1 to N in the order of their arrival. Group i consists of C_i people, joins the end of the queue at time A_i, and leaves the restaurant B_i time units after entering.

Each group enters the restaurant by leaving the queue at the earliest time when both of the following two conditions are satisfied simultaneously:

- The group is at the front of the queue. In other words, the group is the earliest to have joined among those still in the queue at that point.
- When the number of people in that group and all groups currently in the restaurant (including those entering at exactly that time and excluding those leaving) are combined, there are K or fewer people.

Find the time when each group enters the restaurant.

Constraints

- $1 \leq N \leq 3 \times 10^5$
- $1 \leq K \leq 10^7$
- $1 \leq A_i, B_i \leq 10^7$ ($1 \leq i \leq N$)
- $A_1 < \cdots < A_N$
- $1 \leq C_i \leq K$ ($1 \leq i \leq N$)
- All input values are integers.

Input

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

$$
\begin{array}{l}
N \quad K \\
A_1 \quad B_1 \quad C_1 \\
\vdots \\
A_N \quad B_N \quad C_N
\end{array}
$$

Output

Output N lines. The i-th line ($1 \leq i \leq N$) should contain the time when group i enters the restaurant as an integer.

Sample Input 1

```
4 10
30 300 3
60 45 4
90 45 5
120 45 2
```

Sample Output 1

```
30
60
105
120
```

The entry and exit of each group proceed as follows:

- At time 30, group 1 joins the queue and immediately enters, making the number of customers in the restaurant 3.
- At time 60, group 2 joins the queue and immediately enters, making the number of customers in the restaurant 7.
- At time 90, group 3 joins the queue.
- At time 105, group 2 leaves, making the number of customers in the restaurant 3. Immediately after, group 3 enters, making the number of customers in the restaurant 8.
- At time 120, group 4 joins the queue and immediately enters, making the number of customers in the restaurant 10.
- At time 150, group 3 leaves, making the number of customers in the restaurant 5.
- At time 165, group 4 leaves, making the number of customers in the restaurant 3.
- At time 330, group 1 leaves, making the number of customers in the restaurant 0.

Sample Input 2

```
4 10
30 300 10
60 45 2
90 45 3
120 45 4
```

Sample Output 2

```
30
330
330
330
```

The entry and exit of each group proceed as follows:

- At time 30, group 1 joins the queue and immediately enters, making the number of customers in the restaurant 10.
- At time 60, group 2 joins the queue.
- At time 90, group 3 joins the queue.
- At time 120, group 4 joins the queue.
- At time 330, group 1 leaves, making the number of customers in the restaurant 0. Immediately after, groups $2, 3, 4$ enter, making the number of customers in the restaurant 9.
- At time 375, groups $2, 3, 4$ leave, making the number of customers in the restaurant 0.

Sample Input 3

```
10 24
279290 9485601 1
1094410 8022270 4
1314176 7214745 5
1897674 5924694 10
1921802 5769841 4
2506394 2765234 2
2558629 2727489 9
2681289 4061363 5
3022540 2291905 3
4407692 1313036 8
```

Sample Output 3

```
279290
1094410
1314176
1897674
1921802
7691643
7822368
8528921
8528921
10549857
```

E - Sum of Subarrays

Time Limit: 2 sec / Memory Limit: 1024 MiB

Score : 475 points

Problem Statement

You are given an integer sequence $A = (A_1, A_2, \dots, A_N)$ of length N.

Q queries are given, so find the answer for each.

In the i-th query, integers L_i and R_i are given, so find $\displaystyle\sum_{l=L_i}^{R_i}\sum_{r=l}^{R_i}\sum_{j=l}^{r} A_j$ as the answer.

Constraints

- $1 \leq N, Q \leq 3 \times 10^5$
- $1 \leq A_i \leq 100$
- $1 \leq L_i \leq R_i \leq N$
- All input values are integers.

Input

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

$$
\begin{array}{l}
N \quad Q \\
A_1 \quad A_2 \quad \dots \quad A_N \\
L_1 \quad R_1 \\
L_2 \quad R_2 \\
\vdots \\
L_Q \quad R_Q
\end{array}
$$

Output

Output Q lines. The i-th line should contain the answer to the i-th query.

Sample Input 1

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

Sample Output 1

```
24
44
74
3
```

We explain the first query.

The value to be calculated is $\sum_{l=2}^{4}\sum_{r=l}^{4}\sum_{j=l}^{r} A_j$.

- When $l=2, r=2, \sum_{j=l}^{r} A_j = 1$.
- When $l=2, r=3, \sum_{j=l}^{r} A_j = 4$.
- When $l=2, r=4, \sum_{j=l}^{r} A_j = 7$.
- When $l=3, r=3, \sum_{j=l}^{r} A_j = 3$.
- When $l=3, r=4, \sum_{j=l}^{r} A_j = 6$.
- When $l=4, r=4, \sum_{j=l}^{r} A_j = 3$.

From the above, the value to be calculated is $(1+4+7)+(3+6)+3=24$.

F - Loud Cicada

Time Limit: 2 sec / Memory Limit: 1024 MiB

Score : 525 points

Problem Statement

AtCoder Island has N species of cicadas. Cicadas of species i $(1 \leq i \leq N)$ have mass outbreaks only in years that are multiples of A_i.

Among the Y years from year 1 to year Y, find how many years have mass outbreaks of exactly M species of cicadas.

Constraints

- $1 \leq M \leq N \leq 20$
- $1 \leq Y \leq 10^{18}$
- $1 \leq A_i \leq 10^{18}$ $(1 \leq i \leq N)$
- All input values are integers.

Input

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

$$
\begin{array}{l}
N \quad M \quad Y \\
A_1 \quad \cdots \quad A_N
\end{array}
$$

Output

Output the answer.

Sample Input 1

```
3 2 16
4 2 3
```

Sample Output 1

```
4
```

From years 1 to 16, each species of cicada has mass outbreaks in the following years:

- Species 1 cicadas have mass outbreaks in years $4, 8, 12, 16$.
- Species 2 cicadas have mass outbreaks in years $2, 4, 6, 8, 10, 12, 14, 16$.
- Species 3 cicadas have mass outbreaks in years $3, 6, 9, 12, 15$.

From years 1 to 16, exactly two species of cicadas have mass outbreaks four times in years $4, 6, 8, 16$.

Sample Input 2

```
2 1 122333444422333
1429 73651
```

Sample Output 2

```
87266392324
```

The answer may not fit in a 32-bit integer.

Sample Input 3

```
20 3 832725971730072237
19639596380058 49098990950145 32732660633430 114564312217005 68738587330203 45825724886802 252041486877411 180029633483865 108017780
090319 72011853393546 468077047058049 297867211764213 212762294117295 127657376470377 85104917646918 723391799998803 612100753845141
389518661537817 278227615384155 166936569230493
```

Sample Output 3

```
24231
```

Input values may not fit in a 32-bit integer.

G - Small Multiple 2

Time Limit: 2 sec / Memory Limit: 1024 MiB

Score : 600 points

Problem Statement

Find the minimum possible value of a positive integer n that satisfies the following two conditions:

- n is a multiple of K.
- The decimal representation of n contains S as a substring.

T test cases are given, so find the answer for each.

▶ What is a substring?

Constraints

- T is an integer.
- $1 \leq T \leq 200$
- K is an integer.
- $1 \leq K \leq 10^9$
- S is a string consisting of digits (`0` - `9`).
- The first character of S is not `0`.
- $1 \leq |S| \leq 5 \times 10^5$
- For each input file, the sum of $|S|$ over all test cases is at most 5×10^5.

Input

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

$$\begin{array}{l} T \\ \text{case}_1 \\ \text{case}_2 \\ \vdots \\ \text{case}_T \end{array}$$

case_i represents the i-th test case. Each test case is given in the following format:

$$\begin{array}{l} K \\ S \end{array}$$

Output

Output T lines. The i-th line ($1 \leq i \leq T$) should contain the answer to the i-th test case.

Sample Input 1

```
4
271
414
15
23
155521
1000
920950937
9999999999999999999999
```

Sample Output 1

```
34146
1230
100000003
10000009999999999999999999999
```

In the first test case, among positive integers that are multiples of 271, the minimum one whose decimal representation contains `414` as a substring is 34146.

In the second test case, among positive integers that are multiples of 15, the minimum one whose decimal representation contains `23` as a substring is 1230.

In the third test case, among positive integers that are multiples of 155521, the minimum one whose decimal representation contains `1000` as a substring is 100000003.

In the fourth test case, among positive integers that are multiples of 920950937, the minimum one whose decimal representation contains `9999999999999999999999` as a substring is $10000009999999999999999999999$.