



## E Painting a Wall

Time limit: 2s

### Description

You are given a task to paint a wall with specified colours. This wall can be segmented into  $N$  plots numbered 1 to  $N$ . In this problem, each colour can be represented by an integer from 0 to  $M$ . Initially, all plots are coloured 0.

You have formed a plan to paint the wall over  $M$  days, numbered 1 to  $M$ . On day  $i$ , you will paint plots  $L_i$  to  $R_i$  (inclusive) with colour  $i$ . Each plot is painted on at least one of the days. After  $M$  days, the colour of each plot is the colour of the last paint used to paint the plot. In other words, the colour of plot  $j$  is  $W_j$  where  $W_j$  is the largest integer satisfying  $L_{W_j} \leq j \leq R_{W_j}$ .

Nearing the painting day, you realised that you do not own at least one of the paint colours. The paint colours that you own are represented by a bit string  $C$ .  $C_i$  is 1 if you own paint colour  $i$ , or 0 if you do not own paint colour  $i$ .

To paint the wall such that the colour of each plot matches your original plan, you ask your friend to help you paint several colours. Your friend is only willing to paint on consecutive days. You want to minimise the number of painting days done by your friend.

You can reorder the painting days as long as the colour of each plot at the end of  $M$  days matches the original plan.

Formally, you want to find a permutation of  $M$  days  $P_1, P_2, \dots, P_M$  from 1 to  $M$  and days interval  $x$  and  $y$  ( $1 \leq x \leq y \leq M$ ) representing:

- On day  $i$ , plots  $L_{P_i}$  to  $R_{P_i}$  are painted with colour  $P_i$ .
- Your friend paints on days  $x$  to  $y$  (inclusive).

Therefore, the values of  $P_1, P_2, \dots, P_M$ ,  $x$ , and  $y$  must satisfy:

- For each paint colour that you do not own, the painting of that colour is done by your friend. In other words, for each  $i$  satisfying  $C_{P_i} = 0$ ,  $x \leq i \leq y$  holds.
- The colour of plot  $j$  at the end of the paintings matches the original plot. In other words, for each plot  $j$ , if  $V_j$  is the largest integer satisfying  $L_{P_{V_j}} \leq j \leq R_{P_{V_j}}$ , then  $P_{V_j} = W_j$ .
- The value of  $y - x + 1$  is minimised.

Determine the minimum number of painting days done by your friend so that the colour of each plot at the end of  $M$  days matches the original plan.



## Input

The first line contains two integers  $N$  and  $M$  ( $1 \leq N \leq 200\,000$ ;  $1 \leq M \leq 200\,000$ ) separated by a space. The second line contains a bit string  $C$  containing  $M$  bits. At least one character in string  $C$  is '0'. The next  $M$  lines each contain two integers separated by a space. The  $i + 2$ -th line contains integers  $L_i$  and  $R_i$  ( $1 \leq L_i \leq R_i \leq N$ ). Each plot is painted on at least one of the days.

## Output

The first line contains the minimum number of painting days done by your friend so that the colour of each plot at the end of  $M$  days matches the original plan.

### Sample Input 1

6 5	3
01101	
1 2	
2 3	
6 6	
3 4	
4 5	
4 5	

### Sample Output 1

### Sample Input 2

1 2	1
01	
1 1	
1 1	
1 1	

### Sample Output 2

## Explanation of samples

In sample input 1, the colour of each plot at the end of the paintings based on the original plan is  $W = [1, 2, 4, 5, 5, 3]$ . You can swap the third and fourth painting days, so that:

- on day 3, plots 3 to 4 are painted with colour 4, and
- on day 4, plots 6 to 6 are painted with colour 3.

In other words,  $P = [1, 2, 4, 3, 5]$ . You can ask your friend to do the paintings on days 1 to 3. It can be shown that you cannot ask your friend to do the paintings for less than 3 days.