OCC '19 G3 - Binary Game

Time limit: 0.6s **Memory limit:** 512M

Bob is learning binary numbers. To help Bob memorize the first 2^k (from 0 to $2^k - 1$) binary representations, his teacher, Mr. Ecurb, designs a binary game. In this game, Bob is given a binary sequence S, which only consists of `0` and `1`, and 2^k substitution rules, where the i^{th} rule ($0 \leq i \leq 2^k - 1$) replaces number i's k-bit binary representation with character c_i ($c_i = 0$ or 1) and generates value v_i. If number i's k-bit binary representation occurs in the sequence S, Bob can apply this rule to replace it with character c_i and get value v_i. Bob's objective is to achieve the maximum value by using these substitution rules on S. Can you write a program to help Bob?

Constraints

For all subtasks:

$1 \leq |S| \leq 300$

$2 \leq k \leq 8$

Subtask	Points	Additional constraints
1	28	$1 \leq \|S\| \leq 50$
2	32	$1 \leq \|S\| \leq 200$
3	40	No additional constraints.

Input Specification

The first line contains two integers, $|S|$ and k, the length of the binary sequence and the length of the binary representation.

The second line contains a binary sequence, S.

2^k lines of input follow. The i^{th} line contains two integers, c_i and v_i, a substitution rule to convert the number i's k-bit binary representation to character c_i with value v_i, ($c_i = 0$ or 1, $1 \leq v_i \leq 10^9$).

Output Specification

Print one integer, the maximum value Bob can achieve by using the substitution rules on sequence S.

Sample Input

```
3 2
101
1 8
1 8
0 16
1 30
```

Sample Output

```
38
```

Explanation of Sample Output

There are 4 substitution rules:

- Rule 1 replaces binary representation 00 with 1 to get value 8
- Rule 2 replaces binary representation 01 with 1 to get value 8
- Rule 3 replaces binary representation 10 with 0 to get value 16
- Rule 4 replaces binary representation 11 with 1 to get value 30

For the input sequence 101, Bob can use Rule 2 to convert S to 11 with value 8 and then use Rule 4 to convert 11 to 1 to get value 30. The total value is 38.