IOI '95 Practice Task 3 - Bar Codes

Time limit: 1.0s **Memory limit:** 8M

IOI '95 - Eindhoven, Netherlands

A bar-code symbol consists of alternating dark and light bars, starting with a dark bar on the left. Each bar is a number of units wide. Figure 1 shows a bar-code symbol consisting of 4 bars that extend over $1 + 2 + 3 + 1 = 7$ units.

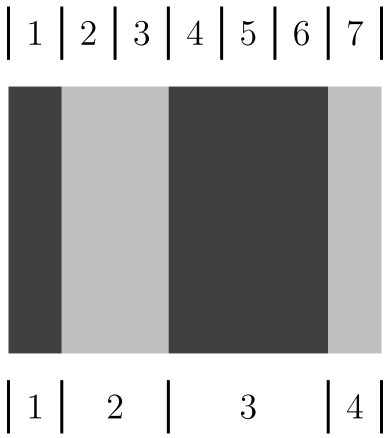

Figure 1: Four fences and some of their letter strings (joints not to scale)

In general, the bar code $BC(n, k, m)$ is the set of all symbols with k bars that together extend over exactly n units, each bar being at most m units wide. For instance, the symbol in Figure 1 belongs to $BC(7, 4, 3)$ but not to $BC(7, 4, 2)$.

```
0: 1000100  |  8: 1100100
1: 1000110  |  9: 1100110
2: 1001000  | 10: 1101000
3: 1001100  | 11: 1101100
4: 1001110  | 12: 1101110
5: 1011000  | 13: 1110010
6: 1011100  | 14: 1110100
7: 1100010  | 15: 1110110
```

Figure 2: All symbols of $BC(7, 4, 3)$

Figure 2 shows all 16 symbols in $BC(7, 4, 3)$. Each `1` represents a dark unit, each `0` a light unit. The symbols appear in lexicographic (dictionary) order. The number on the left of the colon (`:`) is the rank of the symbol. The symbol in Figure 1 has rank 4 in $BC(7, 4, 3)$.

Input Specification

The first line of input contains the numbers n, k, and m $(1 \leq n, k, m \leq 33)$. On the second line is a number s $(0 \leq s \leq 100)$. The following s lines each contain some symbol in $BC(n, k, m)$, represented by `0`s and `1`s as in

Figure 2.

Output Specification

On the first line of output, your program should write the total number of symbols in $BC(n, k, m)$ (Subtask A). On each of the s following lines, it should write the rank of the corresponding symbol in the input (Subtask B).

Sample Input

```
7 4 3
5
1001110
1110110
1001100
1001110
1000100
```

Sample Output

```
16
4
15
3
4
0
```