Bar Codes

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.

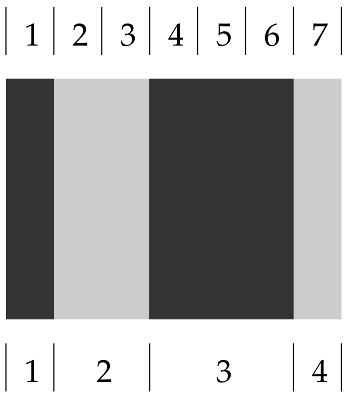

Figure 1: Bar-code symbol over 7 units (see top) with 4 bars (see bottom)

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 Data

The first line of file `INPUT.TXT` 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 Data

On the first line of file `OUTPUT.TXT` 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 file (Subtask B).

Example Input and Output

Figure 3 gives possible input and output files for the example above.

```
INPUT.TXT
7 4 3
5
1001110
1110110
1001100
1001110
1000100
```

```
OUTPUT.TXT
16
4
15
3
4
0
```

Figure 3: Example input and output