Problem TYPESETTING: Alternative Typesetting

A long time ago, one did not use a fictitious story on the problem
statement but directly provided the ...

*Input *

*But nowadays, we are in a period in which
everybody wants the problem to be introduced
by nicely aligned text. That is, the word wraps
are automatically inserted making the lines as
similar as possible. However, one issue remains ...*

The issue is, *what* is meant by similar. The reading eye is only pleased if the text appears to be homogenous. This can be formalized by the *badness of a line*. The badness of a line of text containing m words w_i is calculated as:

$$\text{badness} = b_\ell + \sum_{i=0}^{m-2} |(\text{number of spaces between } w_i \text{ and } w_{i+1}) - 2|^2$$

where b_ℓ is a constant, and the overall badness is defined as the sum of badness over all lines of text.
No justified line is allowed to have leading or trailing spaces and words must always be separated by at least one space. Artistic freedom allows for replacing words with synonyms.

Input

The first line contains two integers, the column width w and the constant b_ℓ. The next line contains the number of synonymous word sets Y. Then follow Y disjunct sets of synonymous words, each on one line, described by its size s and the words it contains.
The next line contains N, and N words in the line after that.
N is guaranteed to be even, $0 < N < 1000$, $0 \leq Y < 1000$, $0 < s < 10$, $0 < w \leq 80$, $0 \leq b_\ell < 10^6$. All words in the input are guaranteed to consist only of ASCII letters, digits and punctuation marks ('.', ',', '!', '?'). All words fit at least twice in a single line (with one space between them).

Output

Output the input words justified so that the overall badness is minimized. If there are multiple possibilities, output any of them.
Hint: The minimum possible badness for sample 1 is 32.

Sample Input 1

```
22 10
2
3 best greatest worldclass
2 greatest! worst.
12
The best of the best of the best will be the greatest!
```

Sample Output 1

```
The   greatest   of   the
greatest of  the  best
will  be  the   worst.
```