COCI '08 Contest 3 #4 Matrica

Time limit: 0.16s **Memory limit:** 32M

A matrix is a rectangular table of letters. A square matrix is a matrix with an equal number of rows and columns. A square matrix M is called **symmetric** if its letters are symmetric with respect to the main diagonal ($M_{ij} = M_{ji}$ for all pairs of i and j).

The following figure shows two symmetric matrices and one which is not symmetric:

```
AAB     AAA
ACC     ABA
BCC     AAA
```

Two symmetric matrices.

```
ABCD    AAB
ABCD    ACA
ABCD    DAA
ABCD
```

Two matrices that are not symmetric.

Given a collection of available letters, you are to output **a subset of columns in the lexicographically smallest symmetric** matrix which can be composed using **all** the letters.

If no such matrix exists, output `IMPOSSIBLE`.

To determine if matrix A is lexicographically smaller than matrix B, consider their elements in row major order (as if you concatenated all rows to form a long string). If the first element in which the matrices differ is smaller in A, then A is lexicographically smaller than B.

Input Specification

The first line of input contains two integers N $(1 \leq N \leq 30\,000)$ and K $(1 \leq K \leq 26)$. N is the dimension of the matrix, while K is the number of distinct letters that will appear.

Each of the following K lines contains an uppercase letter and a positive integer, separated by a space. The integer denotes how many corresponding letters are to be used. For example, if a line says `A 3`, then the letter A must appear three times in the output matrix.

The total number of letters will be exactly N^2. No letter will appear more than once in the input. The next line contains an integer P $(1 \leq P \leq 50)$, the number of columns that must be output. The last line contains P integers, the indices

of columns that must be output. The indices will be between 1 and N inclusive, given in increasing order and without duplicates.

Output Specification

If it is possible to compose a symmetric matrix from the given collection of letters, output the required columns on N lines, each containing P character, without spaces. Otherwise, output `IMPOSSIBLE`.

Scoring

In test cases worth 60% of points, N will be at most 300. In test cases worth 80% of points, N will be at most 3000.

Sample Input 1

```
3 3
A 3
B 2
C 4
3
1 2 3
```

Sample Output 1

```
AAB
ACC
BCC
```

Sample Input 2

```
4 4
A 4
B 4
C 4
D 4
4
1 2 3 4
```

Sample Output 2

```
AABB
AACC
BCDD
BCDD
```

Sample Input 3

```
4 5
E 4
A 3
B 3
C 3
D 3
2
2 4
```

Sample Output 3

```
AC
BE
DE
ED
```

Sample Input 4

```
4 6
F 1
E 3
A 3
B 3
C 3
D 3
4
1 2 3 4
```

Sample Output 4

```
IMPOSSIBLE
```