

Problem E: Word chains

Introduction

How many steps are required to turn a cat into a dog? It can be done in 4 steps:

cat - hat - hot - hog - dog

A word chain is a sequence of words such that there is only a small difference between neighboring words. More precisely,

- Either the two words differ only in a single character (e.g., `table` - `cable`), or
- The two words can be obtained from each other by swapping two adjacent letters (e.g., `center` - `centre`).

Your task is to write a program that finds the cheapest word chain between two given words. Each operation has a fixed cost: the input specifies the cost of replacing a 't' with a 'c', the cost of swapping an 'e' with an 'r' on its right, etc. The total cost of the word chain is the sum of the cost of its operations.

Input

The input contains several blocks of test cases. The first line of each test case contains two integers: the number $2 \leq n \leq 4000$ of words and the number $1 \leq m \leq 26$ of characters in the alphabet. The next n lines contain one word each. These n words have the same length (which is between 1 and 10), and they use only the first m letters of the English alphabet.

The next m lines after that describe the cost of replacing a character with some other character. Each of these m lines contains m integers between 0 and 1000. The j -th integer of the i -th line is the cost of replacing the i -th character of the alphabet with the j -th character (example: the second number in the fourth line is the cost of turning a 'd' into a 'b'). The diagonal entries are all zeros.

The next m lines after that describe the cost of swapping two adjacent characters. Each of these m lines contains m integers between 0 and 1000. The j -th integer of the i -th line is the cost of swapping the i -th character of the alphabet with the j -th character on its right. (Example: the cost of turning `center` into `centre` is the 18th integer in the 5th line, while the cost of turning `centre` into `center` is the 5th integer in the 18th line. These two costs need not be the same.) The diagonal entries are all zeros.

The input is terminated by a block with $n = m = 0$.

Output

For each test case, you have to output a single integer on a separate line: the minimum cost of a chain that starts with the first word in the input and ends with the n -th. Every word of the chain has to be one of the n words listed in the input (but the chain does not have to use all the words). If there is no such chain, then output 'Impossible.' (without quotes).

Sample Input

```
6 4
aba
baa
aab
bad
cab
cad
0 8 2 2
9 0 3 2
9 9 0 9
9 9 9 0
0 1 1 1
1 0 1 1
1 1 0 1
1 1 1 0
0 0
```

Sample Output

```
5
```