

Mock CCC '23 Contest 1 J4 - String Decryption

Time limit: 1.0s **Memory limit:** 512M

The alphabetical sum of an alphabetic string is defined as the sum of the indices of each character in the alphabet. For example, the alphabetical value of the string `abce` is 11, since the indices of `a`, `b`, `c`, and `e` are 1, 2, 3, and 5, respectively, and $1 + 2 + 3 + 5 = 11$.

Steven has a string which consists strictly of lowercase letters and asterisks. The asterisks can each be replaced with any lowercase letter in the English alphabet.

Given an integer N , representing Tommy's desired alphabetical sum, Steven wonders whether it is possible to construct a string with an alphabetical sum of N by replacing the asterisks in his string. If it is, he wants to know the lexicographically smallest such string.

Definition: A string S is lexicographically smaller than a string T if $S \neq T$ and at the first index i where $S_i \neq T_i$, $S_i < T_i$.

Input Specification

The input consists of two lines. The first line contains N , representing Tommy's desired alphabetical sum. The second line contains S , representing the string Steven has.

The following table shows how the available 15 marks are distributed.

Mark Awarded	Expected Alphabetical Value	Length of Steven's String
3 marks	$0 \leq N \leq 10^5$	$1 \leq S \leq 10^3$
12 marks	$0 \leq N \leq 10^9$	$1 \leq S \leq 10^5$

Output Specification

If it is impossible to construct a string that satisfies Tommy's expectations, output `Impossible`.

Otherwise, output the lexicographically smallest string such that the alphabetical sum of the string is N .

Sample Input 1

```
2
a*
```

Output for Sample Input 1

```
aa
```

Explanation of Output for Sample Input 1

The alphabetical sum of `aa` is $1 + 1 = 2$. It can be shown that `aa` is the only possible string in this case.

Sample Input 2

```
4  
a**
```

Output for Sample Input 2

```
aab
```

Explanation of Output for Sample Input 2

The alphabetical value of `aab` is $1 + 1 + 2 = 4$. Other possible strings like `aba` also have 4 as the alphabetical sum, but `aab` is the lexicographically smallest.

Sample Input 3

```
1  
a*
```

Output for Sample Input 3

```
Impossible
```

Explanation of Output for Sample Input 3

It can be shown that we cannot construct a string for this case that has an alphabetical sum of 1.