

Lab 10 Tasks

Q1. Given is an ordered deck of n cards numbered from 1 to n with card 1 at the top and card n at the bottom. The following operation is performed as long as there are **at least two** cards in the deck:

Throw away the top card and move the card that is now on the top of the deck to the bottom of the deck.

Your task is to find the sequence of discarded cards and the last, remaining card.

Each line of input (except the last) contains a number $n \leq 50$. The last line contains 0 and this line should not be processed. For each number from the input produce two lines of output. The first line presents the sequence of discarded cards, the second line reports the last remaining card. See the sample for the expected format.

Example:

Input	Output
7	Discarded cards: 1, 3, 5, 7, 4, 2 Remaining card: 6
19	Discarded cards: 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 4, 8, 12, 16, 2, 10, 18, 14
10	Remaining card: 6
6	Discarded cards: 1, 3, 5, 7, 9, 2, 6, 10, 8 Remaining card: 4
0	Discarded cards: 1, 3, 5, 2, 6 Remaining card: 4

Q3. Ananta Jalil has recently finished writing a book for programmers. Ananta wants the title of the book to be mysterious so that its noticeable among other books. That's why the title should not contain any spaces (single word) and hold **at least one** of each of the first n English letters out of 26 letters. There will be no other types of characters. As he loves reading the text from backward direction, the title should be a palindrome.

Now you have to help Ananta for finding that mysterious title. You are given the title template t consisting of lowercase letters and question marks. Your task is to replace all the question marks by lowercase letters so that the resulting word satisfies the requirements, described above. Each question mark should be replaced by exactly one letter, it is not permitted to delete any characters or add new characters to the template.

Input

For each of the input case, the first line will contain an integer n ($1 \leq n \leq 26$). The second line will contain t which is the given template. In t only the first n lowercase letters of English alphabet and question marks can be present. The length of t is from 1 to 100 characters.

Output

For each of the input case, print one line solution. A single line should contain the mysterious title, satisfying the given template t . The title must be a palindrome and it can only contain the first n letters of the English alphabet. Each of those n letters must be present at least once. If there is no solution, print "IMPOSSIBLE".

Input	Output
3	IMPOSSIBLE
a?c	abba
2	abba
a??a	
2	
?b?a	

Q3. Given an integer n ($0 < n < 100$), count the number continuous zeros starting from the rightmost digit of $n!$. Since $n!$ can be a very large integer it might not be possible to store this value as a number.

Input	Output
10	2
5	1
12	2

Explanation:

$10! = 3628800$ has 2 continuous zeros starting from the rightmost digit

$5! = 120$ has 1 continuous zeros starting from the rightmost digit

$12! = 479001600$ has 2 continuous zeros starting from the rightmost digit

Q4. Given a two-dimensional array print the content of the array in a spiral manner.

Input:	Output:																
<p>4</p> <table><tr><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td>5</td><td>6</td><td>7</td><td>8</td></tr><tr><td>9</td><td>10</td><td>11</td><td>12</td></tr><tr><td>13</td><td>14</td><td>15</td><td>16</td></tr></table>	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	<p>1 2 3 4 8 12 16 15 14 13 9 5 6 7 11 10</p>
1	2	3	4														
5	6	7	8														
9	10	11	12														
13	14	15	16														