CCC '23 S3 - Palindromic Poster

Time limit: 1.0s **Memory limit:** 1G

Canadian Computing Competition: 2023 Stage 1, Senior #3

Ryo and Kita are designing a new poster for Kessoku Band. After some furious brainstorming, they came to the conclusion that the poster should come in the form of a 2-D grid of lowercase English letters (i.e. `a` to `z`), with N rows and M columns.

Furthermore, it is known that Ryo and Kita both have peculiar tastes in palindromes. Ryo will only be satisfied with the poster if exactly R of its rows are palindromes, and Kita will only be satisfied with the poster if exactly C of its columns are palindromes. Can you design a poster that will satisfy both Ryo and Kita, or determine that it is impossible to do so?

Note: A string is considered a palindrome if it is the same when read forwards and backwards. For example, `kayak` and `bb` are palindromes, whereas `guitar` and `live` are not.

Input Specification

The first and only line of input consists of 4 space-separated integers N, M, R, and C.

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

Marks Awarded	Bounds on N	Bounds on M	Bounds on R	Bounds on C
2 marks	$2 \leq N \leq 2\,000$	$2 \leq M \leq 2\,000$	$R = 1$	$C = 1$
2 marks	$N = 2$	$M = 2$	$0 \leq R \leq N$	$0 \leq C \leq M$
4 marks	$N = 2$	$2 \leq M \leq 2\,000$	$0 \leq R \leq N$	$0 \leq C \leq M$
7 marks	$2 \leq N \leq 2\,000$	$2 \leq M \leq 2\,000$	$0 \leq R \leq N$	$0 \leq C \leq M$

Output Specification

If it is impossible to design a poster that will satisfy both Ryo and Kita, output `IMPOSSIBLE` on a single line.

Otherwise, your output should contain N lines, each consisting of M lowercase English letters, representing your poster design. If there are multiple possible designs, output any of them.

Sample Input 1

```
4 5 1 2
```

Output for Sample Input 1

```
union
radar
badge
anime
```

Explanation of Output for Sample Input 1

In the given design, only the second row (namely `radar`) and the second and third columns (namely `naan` and `iddi`) are palindromes. Since exactly $R = 1$ of the rows and $C = 2$ of the columns are palindromes, this is an acceptable design.

Sample Input 2

```
2 2 2 1
```

Output for Sample Input 2

```
IMPOSSIBLE
```

Explanation of Output for Sample Input 2

In this case, it can be proven that it is impossible to satisfy both Ryo and Kita.