Problem 6: Chainsawsage Man
5+3+3+4=15 Point(s)

Problem ID: `sausages`
Rank: `2+2+3+4`

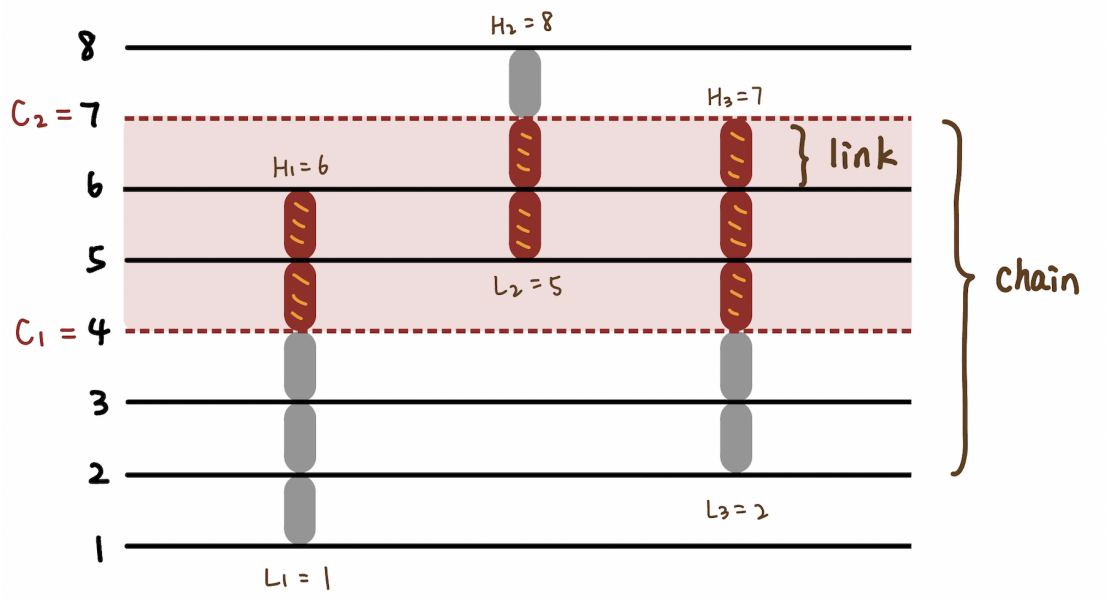
Introduction

Denji is cutting sausage chains with his chainsaws to cook himself a delicious dinner! These sausages mean a lot to him, as they are what is left of his tale of love, manipulation, and betrayal. He wants to savor the experience by eating an exact amount of sausages, but his chainsaws only cut in a very specific way.

Problem Statement

You're given $\mathbf{N}$ *chains* of sausages hanging vertically. The heights of the top of each chain are given by integers $\mathbf{H_1}$, $\mathbf{H_2}$, ..., $\mathbf{H_N}$ and the heights of the bottoms of each chain are given by integers $\mathbf{L_1}$, $\mathbf{L_2}$, ..., $\mathbf{L_N}$. Chains consist of individual sausage *links* of length 1 that connect the bottom to the top. Find two integer positions to cut, c_1 and c_2, so the total number of links between c_1 and c_2 across all chains is $\mathbf{K}$. If no such cut is possible, output `IMPOSSIBLE`.

For example, cutting at $c_1 = 4$ and $c_2 = 7$ would produce the 7 colored sausage links below:



Input Format

The first line of the input contains an integer $\mathbf{T}$ denoting the number of test cases that follow. For each test case:

- The first line contains 2 space-separated integers $\mathbf{N}$ $\mathbf{K}$, where:
  - $\mathbf{N}$ denotes the number of sausage chains.
  - $\mathbf{K}$ denotes the target number of sausage links between your cuts.
- The second line contains $\mathbf{N}$ space-separated integers $\mathbf{H_1}$, $\mathbf{H_2}$, ... , $\mathbf{H_N}$ denoting the heights of the top of each sausage chain.
- The third line contains $\mathbf{N}$ space-separated integers $\mathbf{L_1}$, $\mathbf{L_2}$, ... , $\mathbf{L_N}$ denoting the heights of the bottom of each sausage chain.

Output Format

For each test case, output a single line containing 2 space-separated integers c_1 c_2 denoting positions to cut so the total number of sausage links is $\mathbf{K}$. You can output c_1 and c_2 in any order. If there are multiple valid cuts, output any. If there is no possible cut, output `IMPOSSIBLE`.

Constraints

$1 \le \mathbf{T} \le 100$
$1 \le \mathbf{K} \le 10^{14}$

Main Test Set

$1 \le \mathbf{N} \le 10$
$1 \le \mathbf{L_i} < \mathbf{H_i} \le 10$

Bonus Test Set 1

$1 \le \mathbf{N} \le 200$
$1 \le \mathbf{L_i} < \mathbf{H_i} \le 200$
The sum of $\mathbf{N}$ across all test cases in a test file does not exceed 1000.
The sum of $max(\mathbf{H_i})$ across all test cases in a test file does not exceed 1000.

Bonus Test Set 2

$1 \le \mathbf{N} \le 10^4$
$1 \le \mathbf{L_i} < \mathbf{H_i} \le 10^4$
The sum of $\mathbf{N}$ across all test cases in a test file does not exceed 10^5.
The sum of $max(\mathbf{H_i})$ across all test cases in a test file does not exceed 10^5.

Bonus Test Set 3

Time Limit: 2 seconds (this test set only)
$1 \le \mathbf{N} \le 10^5$
$1 \le \mathbf{L_i} < \mathbf{H_i} \le 10^9$
The sum of $\mathbf{N}$ across all test cases in a test file does not exceed 10^5.
No additional constraints on the sum of $max(\mathbf{H_i})$ across all test cases in a test file.

Sample Test Cases

Sample Input [Download]

```
4
6 8
6 5 8 7 8 3
1 3 5 2 7 1
6 15
6 5 8 7 8 3
1 3 5 2 7 1
7 1
3 3 5 5 5 7 7
2 2 2 4 4 6 6
4 5
6 7 4 7
2 1 2 6
```

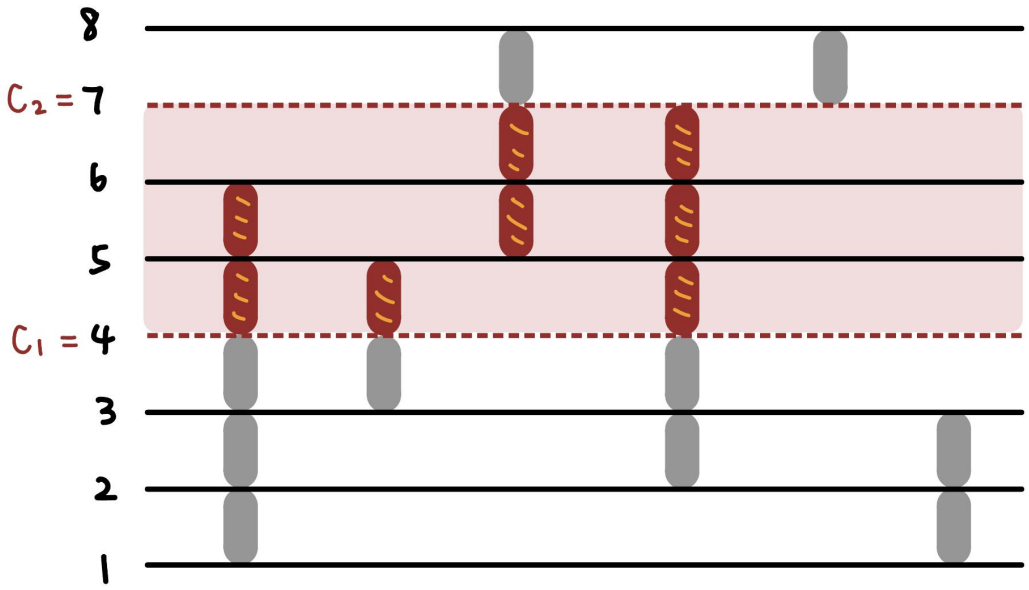
Sample Output [Download]

```
4 7
IMPOSSIBLE
3 4
3 5
```

Note that this is one of many possible correct outputs. If there are multiple solutions, you may output any of them.

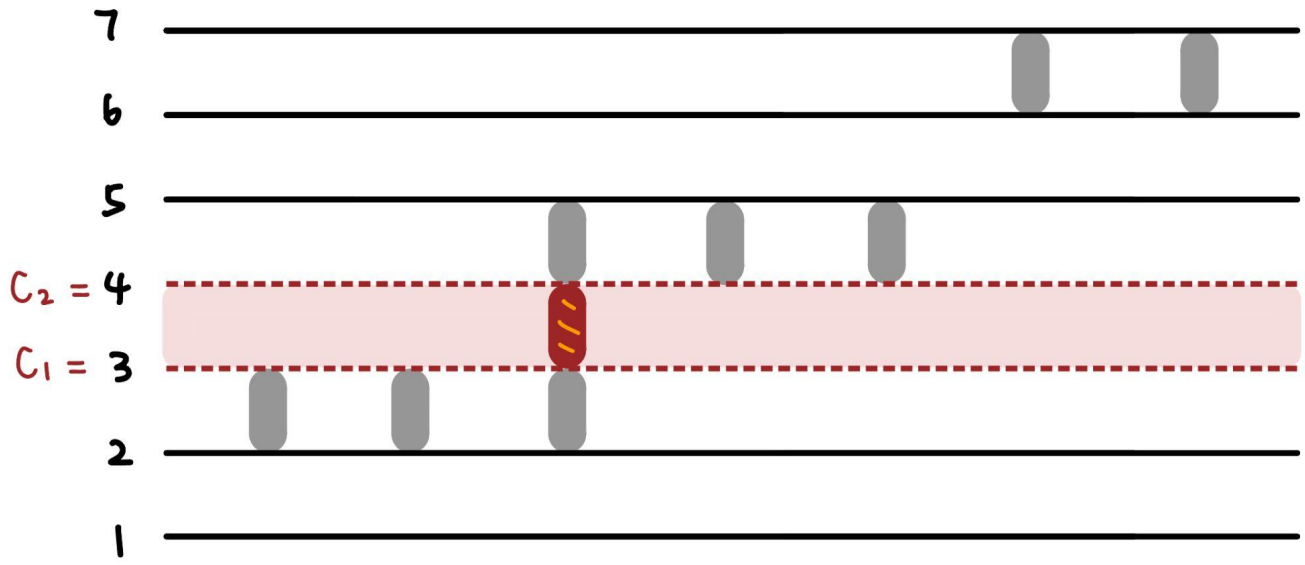
Sample Explanations

For test case #1, we have 6 chains positioned as shown in the figure below, and want to find positions to cut that produce exactly 8 links. One way to achieve this is by cutting at heights c_1 = 4 and c_2 = 7 (or c_1 = 7 and c_2 = 4). Alternatively, you could also cut at heights 1 and 4.



For test case #2, the sausages are positioned the same way as test case #1. However, there's no way to cut the sausages to produce exactly 15 links. (Although 14 and 16 are possible!)

For test case #3, the only way to make cuts that produce exactly 1 link is by cutting the middle link in the third sausage, as shown below.



For test case #4, the only way to make cuts that produce exactly 5 links is by cutting at heights 3 and 5 as shown below. Note that these cut positions are in between sausages and not at endpoints.