Problem 10: Bigsaw
7+4=11 Points

Problem ID: `boxcars`

Rank: `3+3`

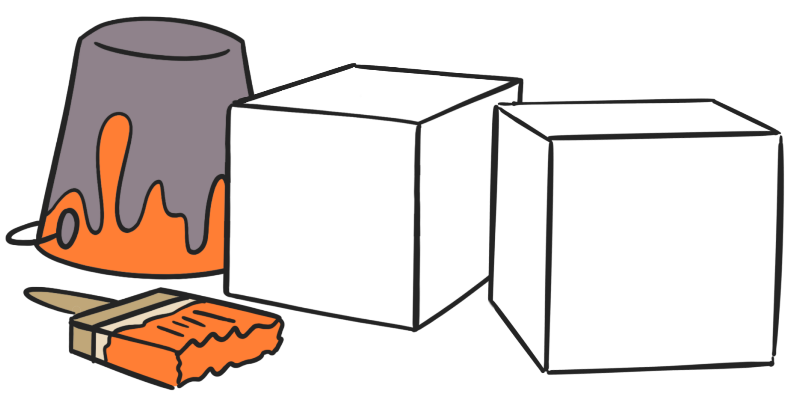
Introduction

Bigsaw has locked you in his basement. You feel around; a damp concrete floor surrounds you. A rusty chain is tied around your ankles. Is this your punishment for complaining about the CALICO contest starting late? A light flickers on. In the corner, you see a figure, locked in a box. It's old and tattered, vaguely resembling a childhood story your mother told you about a silly bear who loved playing with paint, cards, and bricks. Its eyes flash to life, muttering in a staticky robotic voice "30 … 14 … 10". Nervously you walk towards it, where you see two cubes popping about around the bear's box. Underneath it, you find a paintbrush and a bucket of orange paint.

Problem Statement

You're given two cubes with empty faces. You want to paint their faces with numbers, turning them into dice. Find two lists of six positive integers $a_1, a_2, \ldots, a_6$ and $b_1, b_2, \ldots, b_6$ to paint them with such that the sorted list of all pairwise sums $a_1 + b_1, a_1 + b_2, \ldots, a_6 + b_6$ is the same as the given sorted list $\mathbf{S_1}\ \mathbf{S_2} \ldots \mathbf{S_{36}}$.

If there is no solution, output `IMPOSSIBLE`



Input Format

The first line of the input contains a single integer $\mathbf{T}$ denoting the number of test cases that follow. Each test case is described in a single line containing 36 space-separated integers $\mathbf{S_1}\ \mathbf{S_2} \dots \mathbf{S_{36}}$ denoting the desired list of pairwise sums.

Output Format

For each test case, if there exists a valid solution, output two lines:

- The first line should contain six space-separated positive integers $a_1\ a_2 \dots a_6$ denoting the values of the faces on one of the dice.
- The second line should contain six space-separated positive integers $b_1\ b_2 \dots b_6$ denoting the values of the faces on one of the dice.

Otherwise, output a single line containing `IMPOSSIBLE`

Constraints

Time limit: 2 seconds (both test sets)

There are exactly 36 values in $\mathbf{S}$.
$2 \le \mathbf{S}_i \le 10^9$ for all i
$\mathbf{S_1}\ \mathbf{S_2} \dots \mathbf{S_{36}}$ are sorted in nondecreasing order.

Main Test Set

$1 \le \mathbf{T} \le 5$

Bonus Test Set

$1 \le \mathbf{T} \le 100$

Sample Test Cases

Sample Input

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```
5
2 3 3 4 4 4 5 5 5 5 6 6 6 6 6 7 7 7 7 7 7 8 8 8 8 8 9 9 9 9 10 10 10
11 11 12
2 2 4 4 4 4 4 5 5 5 5 6 6 6 7 7 7 7 7 7 7 7 7 9 9 9 9 10 10 12 12 12
14 14 14 17
12 13 19 19 20 20 21 22 22 23 26 30 32 33 33 35 36 37 37 39 39 39 40
41 42 42 43 43 50 50 52 53 56 60 62 73
86 94 142 214 222 270 283 337 345 352 360 362 393 408 408 411 490 534
536 536 544 549 592 612 613 620 628 659 668 674 733 809 812 858 888
934
2 3 3 4 4 4 5 5 5 5 6 6 6 6 6 7 7 7 7 7 7 8 8 8 8 8 9 9 9 9 10 10 10
11 11 11
```

*Note: Each test case input listed above is on **ONE LINE**, despite what it may appear as above due to line wrapping. The original file can be downloaded here.*

Sample Output

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```
1 2 3 4 5 6
1 2 3 4 5 6
1 1 3 3 3 6
1 3 4 4 6 11
21 38 27 25 8 7
15 12 5 35 12 14
270 4 530 132 255 454
279 404 82 138 358 90
IMPOSSIBLE
```

Note: Each test case output listed above is still two lines, one for each die.

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, the distribution for the two dice in the solution is shown below on the left. Note that the same distribution can also be achieved with two other dice (also known as Sicherman dice), whose sums are shown below on the right.

	1	2	3	4	5	6
1	2	3	4	5	6	7
2	3	4	5	6	7	8
3	4	5	6	7	8	9
4	5	6	7	8	9	10
5	6	7	8	9	10	11
6	7	8	9	10	11	12

	1	2	2	3	3	4
1	2	3	3	4	4	5
3	4	5	5	6	6	7
4	5	6	6	7	7	8
5	6	7	7	8	8	9
6	7	8	8	9	9	10
8	9	10	10	11	11	12

Either solution is acceptable for the given input, so the program outputs `1 2 3 4 5 6` and `1 2 3 4 5 6`

For test case #3, the distribution can be achieved with the dice `7 8 21 25 27 38` and `5 12 12 14 15 35`, as demonstrated below:

	7	8	21	25	27	38
5	12	13	26	30	32	43
12	19	20	33	37	39	50
12	19	20	33	37	39	50
14	21	22	35	39	41	52
15	22	23	36	40	42	53
35	42	43	56	60	62	73

Note that there exists other solutions that can yield the same distribution.

For test case #5, despite being very similar to the distribution of a standard die, no assignment of values exists that yields a valid solution, so we output `IMPOSSIBLE`