# Problem C. Coprime Heaven

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|---|---|
| Input file: | *standard input* |
| Output file: | *standard output* |
| Time limit: | 1 second |
| Memory limit: | 512 mebibytes |

The math class is too easy for genius like Nozomi. So she wants to play some single player card game during the class. But since she is a genius, normal single player card game like Solitaire is too easy for her. Thus she creates a hard game called "Coprime Heaven".

There are $n$ cards in this game, and the $i$-th card is written with an integer $i$. At the beginning, she picks $m$ lucky positive integers $l_1, l_2, \ldots, l_m$ with $\sum_{i=1}^{m} l_i = n$. Then she tries to partition the cards into $m$ circles, such that each pair of adjacent cards are coprime.

For example, if $n = 5, m = 2, l_1 = 2, l_2 = 3$, we can partition the cards into two circles $\langle 5, 2\rangle$ and $\langle 3, 1, 4\rangle$, since all adjacent pairs $(5, 2), (2, 5), (3, 1), (1, 4), (4, 3)$ are coprime. Note that a circle with only one number will always be valid.

We also want to be as smart as Nozomi, so here are $T$ coprime heaven puzzles for you.

## Input

The first line contains an integer $T$. Each of following $T$ lines contains lucky numbers of one coprime heaven puzzle.

- $1 \le T \le 2000$
- $1 \le m \le 4$
- $1 \le l_i \le 500$
- $l_i$ is sorted in non-decreasing order

## Output

For each puzzle, please print a line with "`QQ`" if there is no valid partition. Otherwise, please print a line with "`^_<`". Followed by $m$ lines denote a valid partition. Note that the order of circles should be same as lucky numbers.

## Examples

| standard input | standard output |
|---|---|
| 4<br>1<br>2 3<br>4 5 6<br>7 8 9 10 | ^_<<br>1<br>^_<<br>2 3<br>5 1 4<br>^_<<br>1 14 15 8<br>6 11 12 5 13<br>10 7 4 9 2 3<br>QQ |