

## C. Mex in the Grid

time limit per test: 2 seconds  
memory limit per test: 256 megabytes

You are given  $n^2$  cards with values from 0 to  $n^2 - 1$ . You are to arrange them in a  $n$  by  $n$  grid such that there is **exactly** one card in each cell.

The MEX (minimum excluded value) of a subgrid\* is defined as the smallest non-negative integer that does not appear in the subgrid.

Your task is to arrange the cards such that the sum of MEX values over all  $\left(\frac{n(n+1)}{2}\right)^2$  subgrids is maximized.

\* A subgrid of a  $n$  by  $n$  grid is specified by four numbers  $l_1, r_1, l_2, r_2$  satisfying  $1 \leq l_1 \leq r_1 \leq n$  and  $1 \leq l_2 \leq r_2 \leq n$ . The element in the  $i$ -th row and the  $j$ -th column of the grid is part of the subgrid if and only if  $l_1 \leq i \leq r_1$  and  $l_2 \leq j \leq r_2$ .

### Input

Each test contains multiple test cases. The first line contains the number of test cases  $t$  ( $1 \leq t \leq 100$ ). The description of the test cases follows.

The first line of each test case contains a single integer  $n$  ( $1 \leq n \leq 500$ ) — the side length of the grid.

It is guaranteed that the sum of  $n$  over all test cases does not exceed 1000.

### Output

For each test case, output  $n$  lines, each containing  $n$  integers representing the elements of the grid.

If there are multiple answers, you can output any of them.

### Example

|        |      |
|--------|------|
| input  | Copy |
| 2      |      |
| 2      |      |
| 3      |      |
| output | Copy |
| 0 1    |      |
| 2 3    |      |
| 8 4 5  |      |
| 6 0 1  |      |
| 7 2 3  |      |

### Note

In the first test case, one valid arrangement is:

|   |   |
|---|---|
| 0 | 1 |
| 2 | 3 |

There are 9 subgrids in total, and the 4 of them with non-zero MEX are shown below:

|   |
|---|
| 0 |
|---|

values:[0] — MEX: 1

|   |   |
|---|---|
| 0 | 1 |
|---|---|

values:[0, 1] — MEX: 2

|   |
|---|
| 0 |
|---|

### Codeforces Round 1024 (Div. 2)

Finished

Practice



### → Virtual participation

Virtual contest is a way to take part in past contest, as close as possible to participation on time. It is supported only ICPC mode for virtual contests. If you've seen these problems, a virtual contest is not for you - solve these problems in the archive. If you just want to solve some problem from a contest, a virtual contest is not for you - solve this problem in the archive. Never use someone else's code, read the tutorials or communicate with other person during a virtual contest.

Start virtual contest

### → Clone Contest to Mashup

You can clone this contest to a mashup.

Clone Contest

### → Submit?

Language: GNU G++23 14.2 (64 bit, ms)

Choose file: Choose File No file chosen

Submit

### → Last submissions

| Submission                | Time              | Verdict  |
|---------------------------|-------------------|----------|
| <a href="#">321882426</a> | May/29/2025 10:38 | Accepted |
| <a href="#">321881867</a> | May/29/2025 10:33 | Accepted |

### → Problem tags

constructive algorithms \*1300

No tag edit access

### → Contest materials

- Announcement (en) ✕
- Tutorial (en) ✕

|   |
|---|
| 2 |
|---|

values:[0, 2] — MEX: 1

|   |   |
|---|---|
| 0 | 1 |
| 2 | 3 |

values:[0, 1, 2, 3] — MEX: 4

The sum of MEX over all subgrids would be  $1 + 2 + 1 + 4 = 8$ . It can be proven that no other arrangements have a larger sum of MEX values.

---

[Codeforces](#) (c) Copyright 2010-2025 Mike Mirzayanov  
The only programming contests Web 2.0 platform  
Server time: May/29/2025 14:38:35<sup>UTC+7</sup> (h1).  
Desktop version, switch to [mobile version](#).  
[Privacy Policy](#) | [Terms and Conditions](#)

Supported by



**ITMO**