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E. Cells Arrangement

time limit per test: 2 seconds

memory limit per test: 256 megabytes

input: standard input

output: standard output

You are given an integer n . You choose n cells $(x_1, y_1), (x_2, y_2), \dots, (x_n, y_n)$ in the grid $n \times n$ where $1 \leq x_i \leq n$ and $1 \leq y_i \leq n$.

Let \mathcal{H} be the set of **distinct** Manhattan distances between any pair of cells. Your task is to maximize the size of \mathcal{H} . Examples of sets and their construction are given in the notes.

If there exists more than one solution, you are allowed to output any.

Manhattan distance between cells (x_1, y_1) and (x_2, y_2) equals $|x_1 - x_2| + |y_1 - y_2|$.

Input

The first line contains a single integer t ($1 \leq t \leq 50$) — the number of test cases.

Each of the following t lines contains a single integer n ($2 \leq n \leq 10^3$).

Output

For each test case, output n points which maximize the size of \mathcal{H} . It is not necessary to output an empty line at the end of the answer for each test case.

Example

input	Copy
5	
2	
3	
4	
5	
6	
output	Copy
1 1	
1 2	
2 1	
2 3	
3 1	
1 1	
1 3	
1 4	
2 1	
5 5	
1 4	
1 5	
1 6	
5 2	
5 5	
6 1	

Codeforces Round 943 (Div. 3)

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++20 13.2 \(64 bit, wi](#)

 Choose file: [Choose File](#) No file chosen



[Submit](#)

→ Problem tags

[constructive algorithms](#) *1600

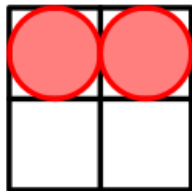
No tag edit access

→ Contest materials

- [Announcement \(en\)](#) 
- [Tutorial \(en\)](#) 

Note

In the first testcase we have $n = 2$. One of the possible arrangements is:



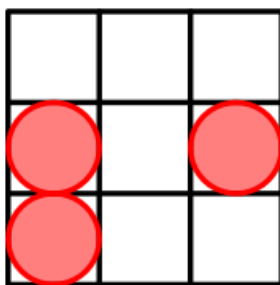
The arrangement with cells located in $(1, 1)$ and $(1, 2)$.

In this case

$$\mathcal{H} = \{|1 - 1| + |1 - 1|, |1 - 1| + |2 - 2|, |1 - 1| + |1 - 2|\} = \{0, 0, 1\} = \{0, 1\}.$$

Hence, the size of \mathcal{H} is 2. It can be shown that it is the greatest possible answer.

In the second testcase we have $n = 3$. The optimal arrangement is:

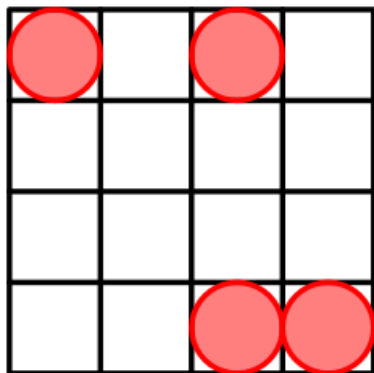


The arrangement with cells located in $(2, 1)$, $(2, 3)$ and $(3, 1)$.

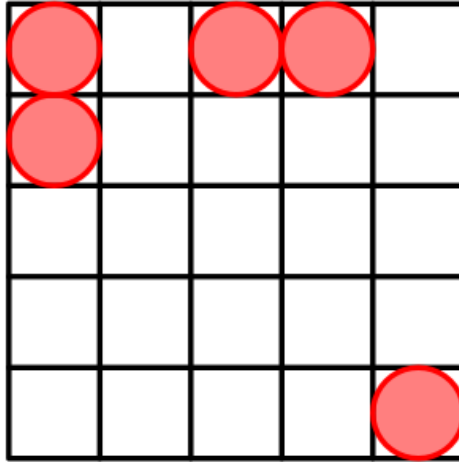
$\mathcal{H} =$

$$\{|2 - 2| + |1 - 1|, |2 - 2| + |3 - 3|, |3 - 3| + |1 - 1|, |2 - 2| + |1 - 3|, |2 - 3| + |1 - 1|, |2 - 3| + |3 - 1|\} \\ = \{0, 0, 0, 2, 1, 3\} = \{0, 1, 2, 3\}.$$

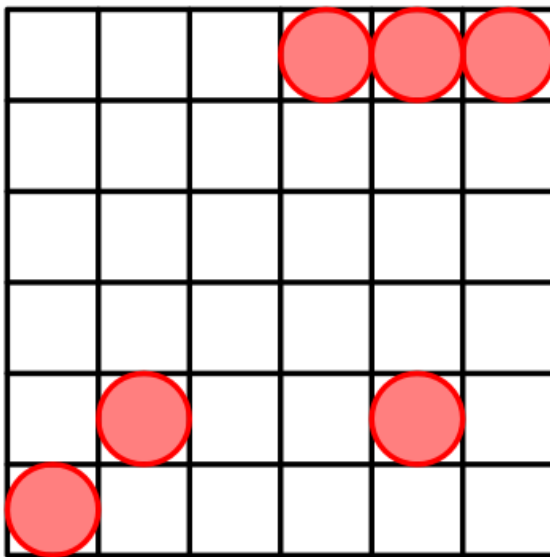
For $n = 4$ a possible arrangement is:



For $n = 5$ a possible arrangement is:



For $n = 6$ a possible arrangement is:



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