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 $(x_1, y_1), (x_2, y_2), \ldots, (x_n, y_n)$ 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

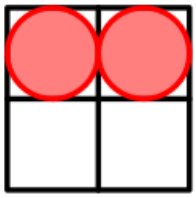
```
5
2
3
4
5
6
```

output Copy

```
1 1
1 2

2 1
2 3
3 1

1 1
1 3
4 3
4 4

1 1
1 3
1 4
2 1
5 5

1 4
1 5
1 6
5 2
5 5
6 1
```

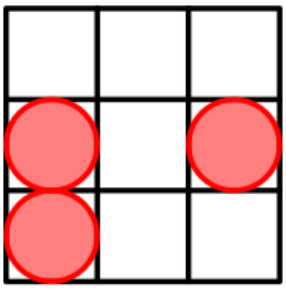
Note

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



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

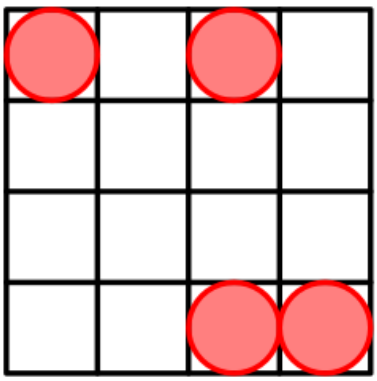
In this case
$\mathcal{H} = \{|1 - 1| + |1 - 1|, |1 - 1| + |2 - 2|, |1 - 1| + |1 - 2|\} = \{0, 0, 1\} = \{0, 1\}$.
Hence, the size of $\mathcal{H}$ is 2. It can be shown that it is the greatest possible answer.
In the second testcase we have $n = 3$. The optimal arrangement is:



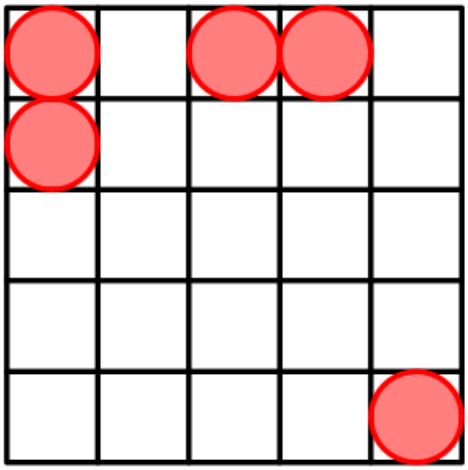
The arrangement with cells located in $(2, 1)$, $(2, 3)$ and $(3, 1)$.

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

For $n = 4$ a possible arrangement is:



For $n = 5$ a possible arrangement is:



For $n = 6$ a possible arrangement is: