7485 Association for Convex Main Office

You are the boss of ACM (Association for Convex Main Office), an upstanding company with a single goal of world domination.

Today, you have decided to move your main office from Helsinki to Singapore. You have purchased a square-shaped land in Singapore, represented as a square on a two dimensional Cartesian plane. The size of your land is $(4 \cdot 10^7) \times (4 \cdot 10^7)$.

After much deliberation, your engineers have devised the optimal shape of your new main office. It will be a grand building, shaped as a convex polygon on the two dimensional grid (a convex polygon is a simple polygon such that for any two of its vertices, the straight line connecting the two vertices is completely inside the polygon). More specifically, your main office is represented by a polygon with at least 3 vertices such that:

- Each vertex is located on a lattice point (lattice points are points which coordinates are integers).
- The coordinates of all vertices are between 0 and $4 \cdot 10^7$, inclusively.
- All vertices are located on distinct points.
- No three vertices are collinear (that is, no three vertices should be on a line).
- All the vertices form a convex polygon in some order.

It is a known fact that the number of vertices composing your main office is very important. A lucky number would positively influence the chance of success for all of your evil missions. Thus, given N, the number of vertices of the main office, can you generate any one possible way to construct your main office? That is, you should output any possible set of N locations of the N vertices of your main office that has the properties described earlier.

Input

The input file contains several test cases, each of them as described below.

The first line contains a non-negative integer $3 \leq N \leq 400\,000$, giving the number of vertices your main office should have.

Output

For each case, output exactly N lines. Each line consists of two integers $0 \leq x, y \leq 4 \cdot 10^7$, denoting the coordinates of a vertex making up your main office. The coordinates can be given in any order and must adhere to your main office's restrictions as described in the problem statement.

Sample Input

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3
4
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Sample Output

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0 0
40000000 0
0 40000000
5 5
0 0
5 0
0 5
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