Prime Triangles

Input file: standard input
Output file: standard output
Time limit: 2 seconds
Memory limit: 256 megabytes

You are given an integer n. Construct exactly n triangles such that the following conditions are satisfied:

- The vertices of the triangles are chosen from a set of at most $\lceil \frac{n}{4} \rceil + 6$ distinct lattice* points.
- All coordinates of the chosen points are in the range $[-10^7, 10^7]$.
- Each triangle has area equal to a prime† number.
- The areas of the n triangles are pairwise distinct.

* A lattice point is a point with integer coordinates.
† A prime number is a natural number greater than 1 with exactly two positive divisors: 1 and itself. For example, 7 and 11 are prime numbers, but 1, 6, and 12 are not.

Input

The first line contains a single integer t ($1 \le t \le 100$) — the number of test cases.

Each test case contains a single integer n ($1 \le n \le 10^5$) — the number of triangles to construct.

It is guaranteed that the sum of n over all test cases does not exceed 10^5.

Output

For each test case, output a valid construction.

First, print a single integer k ($3 \le k \le \lceil \frac{n}{4} \rceil + 6$) — the number of distinct lattice points.

Then print k lines, each containing two integers x_i, y_i ($-10^7 \le x_i, y_i \le 10^7$) — the coordinates of the i-th lattice point. The points must be distinct.

Then print n lines. The i-th line must contain three distinct integers a_i, b_i, c_i ($1 \le a_i, b_i, c_i \le k$) — the indices of the three lattice points forming the i-th triangle.

If there are multiple solutions, output any. It can be shown that a solution always exists under the given constraints.

Example

standard input	standard output
1 3	7 9 7 1 1 6 0 3 3 8 8 5 3 8 2 1 2 3 4 5 6 7 1 5

Note

In the first test case, $n = 3$ and the maximum allowed number of lattice points is $\lceil \frac{3}{4} \rceil + 6 = 7$. The following is a valid construction with 7 points:

- Triangle 1: points $(9,7)$, $(1,1)$, $(6,0)$ with area 19.
- Triangle 2: points $(3,3)$, $(8,8)$, $(5,3)$ with area 5.
- Triangle 3: points $(8,2)$, $(9,7)$, $(8,8)$ with area 3.

All three areas (19, 5, 3) are prime and pairwise distinct.

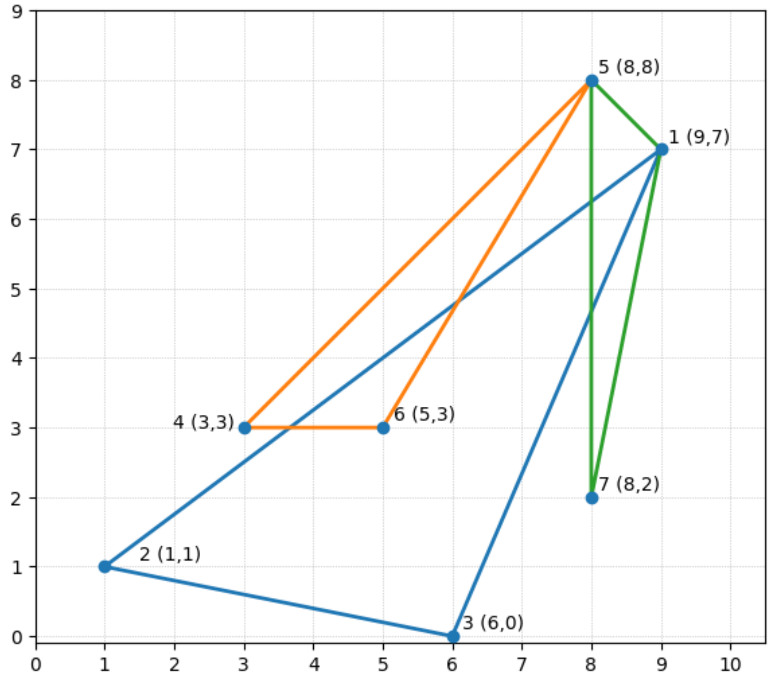

Figure: Prime-area triangle construction for $n = 3$.