D. Prime Graph

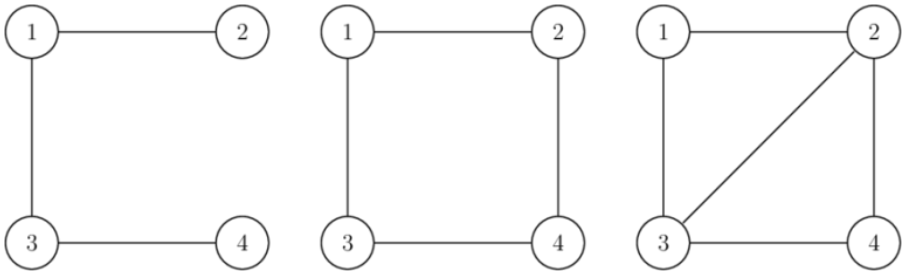
time limit per test: 1 second
memory limit per test: 256 megabytes
input: standard input
output: standard output

Every person likes prime numbers. Alice is a person, thus she also shares the love for them. Bob wanted to give her an affectionate gift but couldn't think of anything inventive. Hence, he will be giving her a graph. How original, Bob! Alice will surely be *thrilled*!

When building the graph, he needs four conditions to be satisfied:

- It must be a simple undirected graph, i.e. without multiple (parallel) edges and self-loops.
- The number of vertices must be exactly n — a number he selected. This number is not necessarily prime.
- The total number of edges must be prime.
- The degree (i.e. the number of edges connected to the vertex) of each vertex must be prime.

Below is an example for $n = 4$. The first graph (left one) is invalid as the degree of vertex 2 (and 4) equals to 1, which is not prime. The second graph (middle one) is invalid as the total number of edges is 4, which is not a prime number. The third graph (right one) is a valid answer for $n = 4$.



Note that the graph can be disconnected.

Please help Bob to find any such graph!

Input

The input consists of a single integer n ($3 \le n \le 1\,000$) — the number of vertices.

Output

If there is no graph satisfying the conditions, print a single line containing the integer -1.

Otherwise, first print a line containing a prime number m ($2 \le m \le \frac{n(n-1)}{2}$) — the number of edges in the graph. Then, print m lines, the i-th of which containing two integers u_i, v_i ($1 \le u_i, v_i \le n$) — meaning that there is an edge between vertices u_i and v_i. The degree of each vertex must be prime. There must be no multiple (parallel) edges or self-loops.

If there are multiple solutions, you may print any of them.

Note that the graph can be disconnected.

Examples

input Copy

```
4
```

output Copy

```
5
1 2
1 3
2 3
2 4
3 4
```

- Announcement #1 (en)
- Announcement #2 (ru)
- Tutorial (en)

input Copy

```
8
```

output Copy

```
13
1 2
1 3
2 3
1 4
2 4
1 5
2 5
1 6
2 6
1 7
1 8
5 8
7 8
```

Note

The first example was described in the statement.

In the second example, the degrees of vertices are $[7, 5, 2, 2, 3, 2, 2, 3]$. Each of these numbers is prime. Additionally, the number of edges, 13, is also a prime number, hence both conditions are satisfied.