

### D. Prime Graph

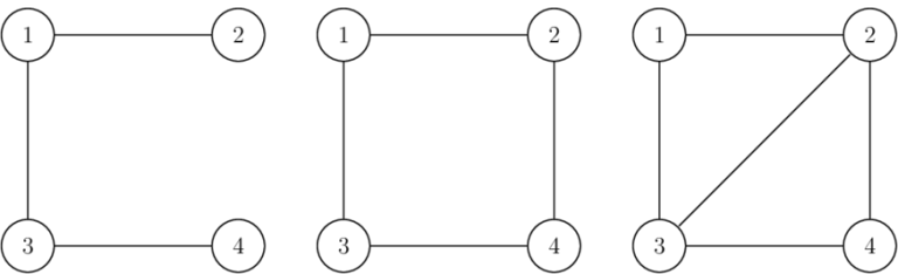
time limit per test: 1 second  
memory limit per test: 256 megabytes  
input: standard input  
output: standard output

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  $n$  ( $3 \leq n \leq 1\,000$ ) — 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  $m$  ( $2 \leq m \leq \frac{n(n-1)}{2}$ ) — the number of edges in the graph. Then, print  $m$  lines, the  $i$ -th of which containing two integers  $u_i, v_i$  ( $1 \leq u_i, v_i \leq n$ ) — 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	

#### Codeforces Global Round 4

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 ACM-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

#### → Practice

You are registered for practice. You can solve problems unofficially. Results can be found in the contest status and in the bottom of standings.

#### → Clone Contest to Mashup

You can clone this contest to a mashup.

Clone Contest

#### → Submit?

Language: GNU G++11 5.1.0

Choose file:  未选择任何文件

Be careful: there is 50 points penalty for submission which fails the pretests or resubmission (except failure on the first test, denial of judgement or similar verdicts). "Passed pretests" submission verdict doesn't guarantee that the solution is absolutely correct and it will pass system tests.

Submit

#### → Last submissions

Submission	Time	Verdict
<a href="#">57433004</a>	Jul/21/2019 05:52	Accepted

#### → Problem tags

constructive algorithms ☒ greedy ☒ math ☒  
number theory ☒ [Add tag](#)

#### → Contest materials

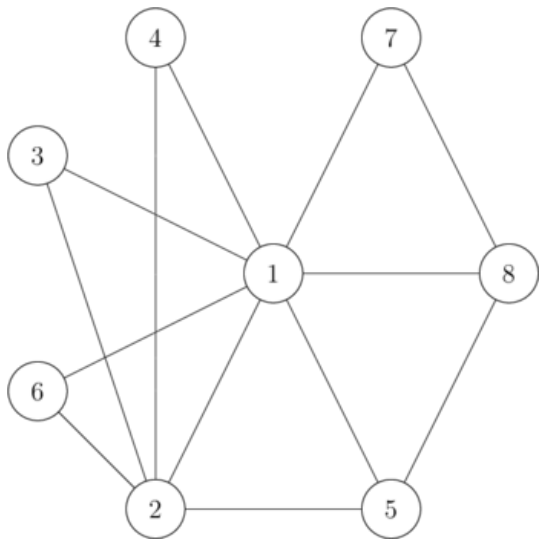
input	Copy
8	
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13	
1 2	
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2 6	
1 7	
1 8	
5 8	
7 8	

- [Announcement #1 \(en\)](#)
- [Announcement #2 \(ru\)](#)
- [Tutorial \(en\)](#)

**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.



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