

Problem: Pretty Average Primes

Problem Description

For various given positive integers $N > 3$, find two primes, A and B such that N is the average (mean) of A and B . That is, N should be equal to $(A + B)/2$.

Recall that a prime number is an integer $P > 1$ which is only divisible by 1 and P . For example, 2; 3; 5; 7; 11 are the first few primes, and 4; 6; 8; 9 are not prime numbers.

Input Specification (pretty.txt)

The first line of input is the number T , which is the number of test cases. Each of the next T lines contain one integer N_i .

Output Specification

The output will consist of T lines. The i th line of output will contain two integers, A_i and B_i , separated by one space. It should be the case that $N_i = (A_i + B_i)/2$ and that A_i and B_i are prime numbers.

If there are more than one possible A_i and B_i for a particular N_i , output any such pair

Sample Input

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4
8
4
7
21
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Possible Output for Sample Input

For 8 The values for A and B are 3 and 13
For 8 The values for A and B are 5 and 11
For 8 The values for A and B are 11 and 5
For 8 The values for A and B are 13 and 3
For 4 The values for A and B are 3 and 5
For 4 The values for A and B are 5 and 3
For 4 The values for A and B are 7 and 1
For 7 The values for A and B are 3 and 11
For 7 The values for A and B are 7 and 7
For 7 The values for A and B are 11 and 3
For 7 The values for A and B are 13 and 1
For 21 The values for A and B are 5 and 37
For 21 The values for A and B are 11 and 31
For 21 The values for A and B are 13 and 29
For 21 The values for A and B are 19 and 23
For 21 The values for A and B are 23 and 19
For 21 The values for A and B are 29 and 13
For 21 The values for A and B are 31 and 11
For 21 The values for A and B are 37 and 5
For 21 The values for A and B are 41 and 1

Explanation of Possible Output for Sample Input

Notice that:

$$8 = (3 + 13)/2;$$

$$4 = (5 + 3)/2;$$

$$7 = (7 + 7)/2;$$

$$21 = (13 + 29)/2;$$

Footnote

You may have heard about Goldbach's conjecture, which states that every even integer greater than 2 can be expressed as the sum of two prime numbers. There is no known proof, yet, so if you want to be famous, prove that conjecture (after you finish this challenge).

This problem can be used to help verify that conjecture, since every even integer can be written as $2N$, and your task is to find two primes A and B such that $2N = A + B$.