ALGERIAN OLYMPIAD IN INFORMATICS & EUREKA NHSM CLUB

The first AOI College Cup

December 14^{th}, 2024

Task 4 - Malek's Evasion
This task is worth 100 points

Task 4 - Malek's Evasion

Time limit per test : 3 seconds
Memory limit per test : 256 megabytes

The evil Alessandro locked up Malek in a wardrobe! The poor guy must answer some questions about some numbers to exit from the wardrobe.

In particular, Alessandro asks Malek Q queries. For each query, Alessandro shouts an integer N_i with a threatening tone. Malek must count the integer solutions to

$$a + b + gcd(a, b) = N_i$$

with $a, b \geq 1$.
Help Malek to escape from the wardrobe by answering the queries.

It is known that :
- $1 \leq Q \leq 2 \cdot 10^5$.
- $1 \leq N_i \leq 4 \cdot 10^6$.

Remark : $gcd(a, b)$ is the greatest common divisor of a, b, that is the maximum positive integer k such that a/k, b/k are both integers.

Input
The input consists of 2 lines, containing:
- Line 1: the integer Q.
- Line 2: the Q integers $N_0, ..., N_{Q1}$.

Output
The output consists of a single line with Q integers, the answers to the Q queries.

Subtasks

Your program will be tested against several test cases grouped in subtasks. In order to obtain the score of a subtask, your program needs to correctly solve all of its test cases

- **Subtask 1** [**8 points**]: $Q = 1, N_i \leq 200$
- **Subtask 2** [**8 points**]: $Q = 1, N_i \leq 2000$
- **Subtask 3** [**13 points**]: $Q = 1, N_i \leq 2 \cdot 10^5$
- **Subtask 4** [**8 points**]: $Q = 1, N_i \leq 5 \cdot 10^5$
- **Subtask 5** [**8 points**]: $Q = 1, N_i \leq 10^6$
- **Subtask 6** [**13 points**]: $Q = 1, N_i \leq 4 \cdot 10^6$
- **Subtask 7** [**13 points**]: $Q = 100, N_i \leq 4 \cdot 10^6$
- **Subtask 8** [**13 points**]: $Q = 50000, N_i \leq 4 \cdot 10^6$
- **Subtask 9** [**8 points**]: $Q = 10^5, N_i \leq 4 \cdot 10^6$
- **Subtask 10** [**8 points**]: No additional limitations.

Examples

Input	Output
3 6 10 13	5 8 4

Input	Output
6 327 869 541 985 214 736	199 388 144 406 192 974