Kick Start 2021 - Round C

Alien Generator

Problem

Astronauts have landed on a new planet, Kickstartos. They have discovered a machine on the planet: a generator that creates gold bars. The generator works as follows. On the first day, an astronaut inputs a positive integer K into the generator. The generator will produce K gold bars that day. The next day, it will produce $K + 1$, the following day, $K + 2$, and so on. Formally, on day i, the generator will produce $K + i - 1$ gold bars.

However, the astronauts also know that there is a limitation to the generator:
if on any day, the generator would end up producing more than $\mathbf{G}$ gold bars in total across all the days, then it will break down on that day and will produce 0 gold bars on that day and thereafter. The astronauts would like to avoid this, so they want to produce exactly $\mathbf{G}$ gold bars.

Consider $K = 2$ and $\mathbf{G} = 8$. On day 1, the generator would produce 2 gold bars. On day 2, the generator would produce 3 more gold bars making the total gold bars is equal to 5. On day 3, the generator would produce 4 more gold bars which would lead to a total of 9 gold bars. Thus, the generator would break on day 3 before producing 4 gold bars. Hence, the total number of gold bars generated is 5 in this case.

Formally, for a given $\mathbf{G}$, astronauts would like to know how many possible values of K on day 1 would eventually produce exactly $\mathbf{G}$ gold bars.

Input

The first line of the input gives the number of test cases, $\mathbf{T}$. $\mathbf{T}$ lines follow.
Each line contains a single integer $\mathbf{G}$, representing the maximum number of gold bars the generator can generate.

Output

For each test case, output one line containing `Case #`x`:` y, where x is the test case number (starting from 1) and y is the number of possible values of K on day 1 that would eventually produce exactly $\mathbf{G}$ gold bars.

Limits

Time limit: 30 seconds.
Memory limit: 1 GB.
$1 \leq \mathbf{T} \leq 100$

Test Set 1

$1 \leq \mathbf{G} \leq 10^4$.

Test Set 2

$1 \leq \mathbf{G} \leq 10^{12}$ for at most 20 test cases.
For the remaining cases, $1 \leq \mathbf{G} \leq 10^4$.

Sample

Sample Input	Sample Output
2 10 125	Case #1: 2 Case #2: 4

For Sample Case #1, there are 2 possible values of K $(1, 10)$ that would eventually produce exactly 10 gold bars. For $K = 1$, we will have $1 + 2 + 3 + 4 = 10$ gold bars after 4 days, and for $K = 10$, we will have 10 gold bars after just 1 day.

For Sample Case #2, there are 4 possible values of K $(8, 23, 62, 125)$ that would eventually produce exactly 125 gold bars.