Code Jam 2008 - Round 1A

Numbers

Problem

In this problem, you have to find the last three digits before the decimal point for the number $(3 + \sqrt{5})^{\mathbf{n}}$.

For example, when **n** = 5, $(3 + \sqrt{5})^5 = 3935.73982...$ The answer is 935.

For **n** = 2, $(3 + \sqrt{5})^2 = 27.4164079...$ The answer is 027.

Input

The first line of input gives the number of cases, **T**. **T** test cases follow, each on a separate line. Each test case contains one positive integer **n**.

Output

For each input case, you should output:

`Case #X: Y`

where **X** is the number of the test case and **Y** is the last three integer digits of the number $(3 + \sqrt{5})^{\mathbf{n}}$. In case that number has fewer than three integer digits, add leading zeros so that your output contains exactly three digits.

Limits

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

Small dataset (Test set 1 - Visible)

$2 \leq \mathbf{n} \leq 30$

Large dataset (Test set 2 - Hidden)

$2 \leq \mathbf{n} \leq 2000000000$

Sample

Sample Input	Sample Output
2 5 2	Case #1: 935 Case #2: 027