Google Code Jam '08 Round 1A Problem C - Numbers

Time limit: 30.0s **Memory limit:** 1G

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

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

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

Input Specification

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 Specification

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 $(3 + \sqrt{5})^n$. 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: 1 GB.

$1 \leq T \leq 100$.

Small Dataset

$2 \leq n \leq 30$.

Large Dataset

$2 \leq n \leq 2\,000\,000\,000$.

Sample Input

```
2
5
2
```

Sample Output

```
Case #1: 935
Case #2: 027
```