10591   Happy Number

Let the sum of the square of the digits of a positive integer S_0 be represented by S_1. In a similar way, let the sum of the squares of the digits of S_1 be represented by S_2 and so on. If $S_i = 1$ for some $i \geq 1$, then the original integer S_0 is said to be Happy number. A number, which is not happy, is called Unhappy number. For example 7 is a Happy number since $7 \rightarrow 49 \rightarrow 97 \rightarrow 130 \rightarrow 10 \rightarrow 1$ and 4 is an Unhappy number since $4 \rightarrow 16 \rightarrow 37 \rightarrow 58 \rightarrow 89 \rightarrow 145 \rightarrow 42 \rightarrow 20 \rightarrow 4$.

Input

The input consists of several test cases, the number of which you are given in the first line of the input. Each test case consists of one line containing a single positive integer N smaller than 10^9.

Output

For each test case, you must print one of the following messages:

```
Case #p:  N is a Happy number.
Case #p:  N is an Unhappy number.
```

Here p stands for the case number (starting from 1). You should print the first message if the number N is a happy number. Otherwise, print the second line.

Sample Input

```
3
7
4
13
```

Sample Output

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Case #1: 7 is a Happy number.
Case #2: 4 is an Unhappy number.
Case #3: 13 is a Happy number.
```