The creator of the universe works in mysterious ways. But he uses a base ten counting system and likes round numbers.

`Scott Adams`

Everyone knows about **base 2** (binary) integers and **base 10** (decimal) integers, but what about **base -2**? An integer n written in **base -2** is a sequence of digits (b_i), writen right-to-left. Each of which is either 0 or 1 (no negative digits!), and the following equality must hold.

$$n = b_0 + b_1(-2) + b_2(-2)^2 + b_3(-2)^3 + \ldots$$

The cool thing is that every integer (including the negative ones) has a unique **base -2** representation, with no minus sign required. Your task is to find this representation.

Input

The first line of input gives the number of cases, N (at most 10000). N test cases follow. Each one is a line containing a decimal integer in the range from -1,000,000,000 to 1,000,000,000.

Output

For each test case, output one line containing '`Case #`x`:`' followed by the same integer, written in base -2 with no leading zeros.

Sample Input

```
4
1
7
-2
0
```

Sample Output

```
Case #1: 1
Case #2: 11011
Case #3: 10
Case #4: 0
```