Small Shop

Mouse Stofl owns a small shop. He wants to offer as many different kinds of cheese as possible. Therefore, he buys everything that he can get. In order to ensure that he does not run out of space, he keeps at most one loaf of cheese of each kind.

If Stofl is visited by a merchant who is selling cheese of kind x, he buys one loaf in case he does not own a loaf of that kind of cheese already. If some customer visits the shop and wants to buy cheese of kind x, Stofl sells such a cheese, of course – in case he has it in stock. Now and then, Stofl creates an inventory of his shop and counts how many different kinds of cheese he has in stock.

Input

The first line of the input contains a natural number N, the number of interactions. The next N lines describe one interaction each, either with a merchant, with a customer, or the creation of an inventory.

All kinds of interactions are identified by some integer number. A positive number x describes a merchant who would like to sell cheese of kind x to Stofl. A negative number x describes a customer who would like to buy cheese of kind x. The number 0 denotes that Stofl wants to create an inventory.

Output

Print one line for each interaction:

- *Thank you!* in case Stofl buys the cheese of a merchant.
- *No space!* in case there is no space for the cheese of a merchant.
- *Here you go!* in case Stofl can sell cheese to a customer.
- *I am sorry!* in case Stofl does not have the requested cheese in stock.
- *The integer 'A'*, the current number of kinds of cheese in stock, in case Stofl wants to create an inventory.

Limits

The input consists of 4 test groups, each is worth 25 points.

- For the first group, we have $1 \leq N \leq 10$, $-N \leq x \leq N$.
- For the second group, we have $1 \leq N \leq 1\,000$, $-N \leq x \leq N$.
- For the third group, we have $1 \leq N \leq 10\,000$, $-N \leq x \leq N$.
- For the fourth group, we have $1 \leq N \leq 200\,000$, $-N \leq x \leq N$.

Example

Input	Output
9 4 2 0 4 -2 -2 -4 3 0	Thank you! Thank you! 2 No space! Here you go! I am sorry! Here you go! Thank you! 1