Genius Cirno's Genius Computer

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	1024 megabytes

Cirno's Perfect Math Class is now in session!

This is an interactive problem.

In the year 9999, the genius ice fairy Cirno has built the supercomputer Cirno9 capable of 1024-bit integer arithmetic (`int1024`)! However, because Cirno is a genius, this machine **only supports integer operations**. Cirno9 **has 8 general-purpose registers (variables)** named $a, b, c, d, r_0, r_1, r_2, r_3$.

As a time traveler from 2025, you've obtained temporary access. Cirno9's first four registers a, b, c, d are initialized with four **positive integers** a_0, b_0, c_0, d_0 representable by `int1024`, while the other four registers $r_0 \cdots r_3$ are set to 0. Your task is to use Cirno9 to compare the fractions $\frac{a_0}{b_0}$ and $\frac{c_0}{d_0}$.

You cannot directly observe the values of a_0, b_0, c_0, d_0, but you can send **at most** 6666 operation requests to Cirno9 and make judgments based on its responses. See the "Interaction Protocol" section below for details.

Complete this task before Cirno releases "Perfect Freeze"!

Additional Notes

Since you come from an era with only `int32` and `int64` (and maybe `int128`), here are extra details about Cirno9's `int1024`:

- `int1024` operations behave similarly to C/C++ int operations, supporting addition, subtraction, multiplication, division (`+ - * /`) and comparisons. Like C/C++, integer division **truncates toward zero**. Examples: $100/3 = 33$, $(-5)/2 = -2$, $(-10)/(-3) = 3$.
- `int1024` can represent integers in $[-2^{1023}, 2^{1023})$. Operations **must not overflow** — results must be representable by `int1024`, otherwise Cirno9 will explode. For **division**, the divisor cannot be 0, or Cirno9 will freeze.

Input

There is no initial input. You must send queries to the interactor.

Interaction Protocol

You may use 8 int1024 variables named $a, b, c, d, r_0, r_1, r_2, r_3$ (corresponding strings: `a b c d r0 r1 r2 r3`).

- a, b, c, d are initialized to positive integers a_0, b_0, c_0, d_0
- r_0, r_1, r_2, r_3 are initialized to 0

You can perform the following operations:

1. `op x y z`: Compute y op z and store in x (op $\in \{$`+`, `-`, `*`, `/`$\}$)
   - Returns `ok` if successful, otherwise `err`
2. `? x y`: Compare x and y
   - Returns `>`, `=`, or `<` indicating the relationship, or `err` if failed
3. `! rel`: Submit final comparison of $\frac{a_0}{b_0}$ and $\frac{c_0}{d_0}$ (rel $\in \{$`>`, `=`, `<`$\}$)
   - Returns `ok` if correct, otherwise `err`

Note: For operation types 1 and 2, variable names may be identical (e.g., "`+ a a b`" or "`* r0 r0 r0`").

Possible reasons for `err` responses:

1. Invalid operation
2. Nonexistent variable
3. Arithmetic overflow or division by zero
4. Exceeding operation limit
5. Incorrect final answer

When receiving `err`, your program will be judged as `Wrong Answer`. You should **immediately terminate** after reading `err` to avoid unexpected evaluation results.

You may perform at most 6666 operations. The final answer doesn't count toward this limit; other operations count as 1 each.

After printing an operation, do not forget to output the end of the line and flush the output. Otherwise you'll receive `Time Limit Exceeded`. Flushing methods:

- C++: `fflush(stdout)` or `cout.flush()`
- Pascal: `flush(output)`
- Java: `System.out.flush()`
- Python: `stdout.flush()`

Example

standard input	standard output
ok ok ok > ok	* r0 a d * r1 b c - r0 r0 r1 ? r0 r2 ! >

Note

In this sample, the initial values inside the interactor are $a = 99$, $b = 999$, $c = 9$, $d = 99$. We need to compare the sizes of $\frac{99}{999}$ and $\frac{9}{99}$.

1. **Operation 1**: `* r0 a d`
   - Compute $a \times d = 99 \times 99 = 9801$, and store the result in r_0.
   - The interactor returns `ok`, indicating the operation succeeded.
2. **Operation 2**: `* r1 b c`
   - Compute $b \times c = 999 \times 9 = 8991$, and store the result in r_1.
   - The interactor returns `ok`, indicating the operation succeeded.
3. **Operation 3**: `- r0 r0 r1`
   - Compute $r_0 - r_1 = 9801 - 8991 = 810$, and store the result in r_0.
   - The interactor returns `ok`, indicating the operation succeeded.
4. **Operation 4**: `? r0 r2`
   - Compare the values of r_0 and r_2. Since $r_0 = 810$ and $r_2 = 0$, we have $r_0 > r_2$.
   - The interactor returns `>`.
5. **Operation 5**: `! >`
   - We know that $\frac{a_0}{b_0} = \frac{99}{999} \approx 0.0991$, and $\frac{c_0}{d_0} = \frac{9}{99} \approx 0.0909$, so the reported answer is correct.
   - The interactor returns `ok`, indicating the answer is correct.

The attachment provides a reference implementation of Cirno9, which you can use to test `int1024`.