

# Problem Mar 14: Pi Day

Time limit: 2 seconds

On the occasion of Pi Day, your friend Amy gifted you a weird calculator. The calculator is not very powerful, as the only operation it supports is addition of non-negative integers.

Its more intriguing feature, however, is that it displays numbers using a cryptic set of symbols that you do not understand. The calculator uses 10 different symbols, which you know correspond to the digits '0' to '9' in some order. You want to figure out which symbol corresponds to which digit.

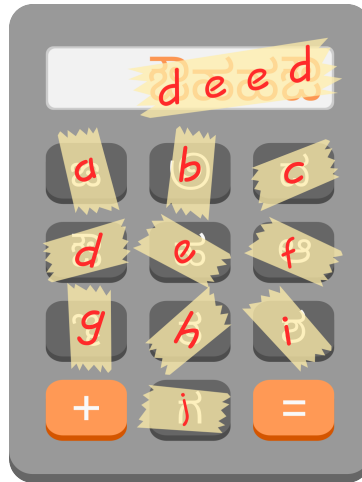


Figure Mar 14.1: Illustration of the initial calculator state in Sample Interaction 1. The symbols have been taped over for easier identification.

To do so, you can type in numbers written using the weird symbols, which the calculator will then add to the current value and display the sum. This sum then becomes the new value.

You hope that by repeating this action enough times you will be able to decode the calculator's symbols into the digits.

## Interaction

This is an interactive problem. Your submission will be run against an *interactor*, which reads from the standard output of your submission and writes to the standard input of your submission. This interaction needs to follow a specific protocol:

For simplicity, we use the lowercase English letters 'a' to 'j' to represent the calculator's weird symbols. The interactor sends encrypted numbers, using a hidden assignment of the digits from '0' to '9' to the lowercase letters.

The first number  $x$  that the interactor sends satisfies  $1 \leq x \leq 10^9$ , but subsequent numbers may be larger than  $10^9$  depending on how much you add. You respond by sending '+', followed by a number that has between 1 and 9 digits, inclusive, in the same format as used by the calculator. The interactor then adds your number to its own number, sends the updated number and the cycle repeats. Your own numbers are allowed to have leading zeroes, but the numbers displayed by the calculator will never have leading zeroes.

You may ask up to 1000 queries. Once you have found the correspondence between symbols and digits, output '=', followed by the current value in plaintext, using the digits '0' to '9'. Note that this does not count towards your query limit. After this, your program must exit.

After every query you should *flush* the standard output to ensure that it is sent to the interactor. For example, you can use `fflush(stdout)` in C++, `System.out.flush()` in Java, `sys.stdout.flush()` in Python, and `hFlush stdout` in Haskell.

A testing tool is provided to help you develop your solution.

Read	Sample Interaction 1	Write
deed	+ high	
acid	+ hedge	
chief	= 10839	

Read	Sample Interaction 2	Write
e	+ abc	
aah	+ g	
aae	+ f	
aaa	+ i	
ijjj	= 1000	