

## 11046 Numbers and operations

We want to solve the classical problem of obtaining a given *target* number starting from a set of initial numbers according to the following rules:

- All numbers involved in the problem are positive integers, and so must be any intermediate result obtained for any operation. Thus, operations that lead to non integer or non positive numbers are strictly forbidden (we shall not consider *truncation* or *rounding* results, nor anything else like that).
- We can do any of the four elemental arithmetical operations: addition, multiplication, subtraction, and division.
- Each number may be used once at most: when we take two numbers and operate them, these numbers may not be used again in further operations (but the result of this operation may, and same considerations apply to this new number).
- There is no obligation to make use of all of the initial numbers.



We shall make the following assumptions on the input data:

- For any target number  $T$ , it will always hold that:  $0 < T < 2000$ .
- For any initial number  $I$ , it will always hold that:  $0 < I < 200$ .
- There will always be at least two initial numbers and seven at most.
- We shall not consider trivial problem cases, i.e. cases in which the target number is already contained in the initial ones.

In order to make unique the solution provided by the program, we shall also make the following assumptions on the solution that we will consider as correct:

The program should provide the solution that reaches the target in the minimum number of operations. If there is more than one solution with the minimum number of operations, we will decide which one to take according to the characteristics of the first operation in which they differ. The next rules will apply.

- For two operations that are actually the same one, it will be preferred the one whose left-side operand is greater than, or equal to, the right-side operand. For example, operation “ $10 \times 5 = 50$ ” will take priority over “ $5 \times 10 = 50$ ”.

- For operations involving two different operators, it will be preferred the one whose operator has the highest precedence, defined as follows:
  - Addition (highest)
  - Multiplication
  - Subtraction
  - Division (lowest)
- For operations with the same operator, it will be preferred the one involving the number whose position is lower in the order in which they were given in the input (it appears first). If this first number may appear in two different operations of same precedence, same criterion should be applied for the second operand. New numbers generated by operations are assumed to be placed at the beginning of this ordered list.

## Input

The input consists of a set of lines. Each line represents a test case, and it will be given in the following format:

$T N I_1 \dots I_N$

$T$  is the target number,  $N$  is the number of initial numbers, and  $I_1 \dots I_N$  are the initial numbers themselves. All numbers are separated by a single blank space. There will be no trailing/leading blank spaces at the beginning/end of any input line. A final line with a single zero marks the end of the input. This last line must not be processed.

## Output

For each input case (input line), the program should produce a line with the message:

No solution

if the target number cannot be obtained from the initial numbers, or a set of lines with the sequence of operations that leads from the initial numbers to the target, taking into consideration the previous criteria. Each operation must be expressed in the following format:

$left\_operand \ operator \ right\_operand = result$

where  $left\_operand$  and  $right\_operand$  represent the numbers involved in the operation,  $result$  is the result of the operation, and  $operator$  is a single character that represents the operation carried out, and it must be taken from the following ones:

‘+’ : addition  
‘x’ : multiplication  
‘-’ : subtraction  
‘/’ : division

For each input case, the last line of its solution must end with a ‘<-’ symbol, indicating that this is the last operation that gives the target number as result. In all cases, there must be one blank space (and only one) between each printed item and the following one. There should be no leading/trailing blank spaces at the beginning/end of any output line. Each line must end with an *end of line* mark, and there should appear no blank lines at the output.

**Sample Input**

```
811 6 7 15 19 25 2 3
911 6 1 2 3 4 5 6
1897 7 33 2 11 25 7 17 13
911 7 7 11 23 27 17 7 2
0
```

**Sample Output**

```
15 + 7 = 22
22 x 19 = 418
418 x 2 = 836
836 - 25 = 811
```