Problem 4. 6174

The number 6174 is known as **Kaprekar's constant** after the Indian mathematician D. R. Kaprekar. This number is renowned for the following rule:

1. Take any four-digit number, using at least two different digits (leading zeros are allowed).
2. Arrange the digits in descending and then in ascending order to get two four-digit numbers, adding leading zeros if necessary.
3. Subtract the smaller number from the bigger number.
4. Go back to step 2 and repeat.

The above process, known as *Kaprekar's routine*, will always reach its fixed point, 6174, in at most 7 iterations. Once 6174 is reached, the process will continue yielding $7641 - 1467 = 6174$. For example, choose 1459:

$$\begin{aligned} 9541 - 1459 &= 8082 \\ 8820 - 288 &= 8532 \\ 8532 - 2358 &= 6174 \end{aligned}$$

Write a program that simulates this process. Note that

- The input number should not contain more than 4 digits and should contain at least two different digits (i.e. not a *repdigit* like 1111, 2222, ...). These numbers are said to be ***invalid***.
- The input number may contain less than 4 digits. For example, start with 9:

$$\begin{aligned} 9000 - 9 &= 8991 \\ 9981 - 1899 &= 8082 \\ 8820 - 288 &= 8532 \\ 8532 - 2358 &= 6174 \end{aligned}$$

Hint

The functions given in **[Problem 1] Basic knowledge** may be helpful for this problem.

Input format

On the first line, a nonnegative integer n.

Then n lines follow, the i-th of which contains a nonnegative integer x_i. It is guaranteed that x_i is representable by `int`.

Output format

For each of the n input integers, either report that it is invalid or simulate the Kaprekar's routine and print the steps (see below).

If for some i the integer x_i contains more than 4 digits, print `xxx contains more than 4 digits.` where `xxx` is replaced with x_i. If x_i contains no more than 4 digits but is a *repdigit*, print `xxx is a repdigit.` where `xxx` is replaced with x_i.

A step in the Kaprekar's routine should be printed in the form `xxx - yyy = zzz`, where `xxx`, `yyy` and `zzz` are replaced with the corresponding numbers. Note that leading zeros **are not printed** (see the example below). The process stops when `zzz` reaches 6174.

If the input is already 6174, you should print nothing and start processing next input.

You don't have to start printing after all inputs are consumed! Do not waste efforts saving the things to be printed.

Example

Input

```
5
123456
0
22
4444
1459
```

Output

```
123456 contains more than 4 digits.
0 is a repdigit.
2200 - 22 = 2178
8721 - 1278 = 7443
7443 - 3447 = 3996
9963 - 3699 = 6264
6642 - 2466 = 4176
7641 - 1467 = 6174
4444 is a repdigit.
9541 - 1459 = 8082
8820 - 288 = 8532
8532 - 2358 = 6174
```