Challenge: “Alpha Math”
Level: Non-beginner

Description:

Imagine a valid math statement which has had each number and symbol replaced by another character. Given one of these “replaced” math statements, find a combination of numbers and symbols to replace each character from the input set which solves the math problem.

Example input set:

A string representing an abstract math statement such that:

- A valid math statement existed, and contained no spaces
- Each number or symbol from the valid math statement was replaced one by one with another character
- Each math statement contained exactly one = symbol
- Each character will be restricted to representing the values 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, +, -, *, /, =
- There will be no “leading zeroes” on any number
- Each number is not necessarily replaced by the same letter
- For the purposes of the input sets for this challenge, there are no invalid characters in the input sets

```
HI!HO6YES
```

Sample solution:

If we replace the following characters:

```
H => 5
I => 2
! => +
O => 4
6 => =
Y => 1
E => 0
S => 6
```

(Note that both H are replaced by a number 5)

The math statement is now:

```
52+54=106
```

This is a valid mathematical statement which also fulfills the “pattern” of the input set.

PASS/FAIL:

The solution will be considered PASSED if it returns an output which:

- **Is properly formatted**
  The output will:
  - Be the same length as the input
  - Contain only numbers 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, +, -, *, /, =
  - Contain exactly one =

  ```
  11+22=33
  ```

  If multiple solutions are found, they should be submitted with a space between them. For example:

  ```
  11+22=33 22+33=55 33+44=77
  ```

  (The submission of multiple valid problem statements will be used in tiebreaker scenarios. See the Tiebreakers section below for more information. If multiple problem statements are submitted, all problem statements must be valid.)
- **Follows the substitution rules**
  Each unique number should replace a unique letter from the input set. That is, if the input set has two letter B, they must both be replaced by the same number or symbol.
  Is a valid mathematical statement
- **Is unique**
  Multiple identical solutions for a single input set will not be considered valid.

All other solutions will be considered FAILED.

Tiebreakers:

The code you submit will be called several times, with a different input set each time. If more than one team outputs a correct solution to at least one input set, the following tiebreaker scenarios will be used to determine the ordering of teams for this challenge, in the order given below:

- Most input sets solved successfully, highest number winning the tiebreaker. Each input set will be weighted equally for this tiebreaker (e.g. no extra points for solving a “more difficult” input set).
- Total number of valid solutions found, summed across all input sets, highest number winning the tiebreaker. If Team A finds one valid solution for input set 1, two valid solutions for input set 2, and two valid solutions for input set 3, their total number of valid solutions is 5. Team B must find 6 or more valid solutions to win the tiebreaker.
- Submission time, earliest submission winning the tiebreaker.