Problem 273: Did We Calculate Correctly?

Difficulty: Hard

Author: Chuck Nguyen, Rockville, Maryland, United States

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Problem Background

Math is incredibly important; with math, we can do everything from managing our finances to traveling to the moon, Mars, and beyond! As a result, getting the correct answer to a math problem is often very important.

Problem Description

Given a mathematical problem, your program must determine if the problem was solved correctly. Problems may include any combination of the following operations in any order:

- Addition: **4+4=8**
- Subtraction: **4-4=0**
- Multiplication: **4*4=16**
- Division: **4/4=1** (you will never be required to divide by zero)
- Exponents: **4^4=256** (the value following the ^ will always be a positive integer)
- Square roots: **SQRT(4)=2** (the value subject to the square root will always be a positive integer contained within parentheses)

When an equation includes multiple operations, be sure to process them according to the usual order of operations. Equations may also include parenthesis to influence this ordering.

If using Python, we **strongly recommend** against using the **eval()** function to determine the correct result of the equation. Certain quirks regarding Python's order of operations will cause **eval()** to misinterpret some equations, resulting in a wrong answer. Our judging team will not provide any details of the test cases that are likely to encounter this problem.

Sample Input

The first line of your program's input, **received from the standard input channel**, will contain a positive integer representing the number of test cases. Each test case will include a single line containing a mathematical equation. Equations will include at least one of the operations listed above in the formats indicated and may also include parenthesis. Any number may appear within equations except as otherwise indicated above. Each equation will end with an equals sign (=) and a numeric result, which may or may not be correct.

```
4
2*3+5*4=26
20/20*9=10
4*(5*-1)=-20
3^5-SQRT(20)=238
```

Sample Output

For each test case, your program must print the word "Correct" if the given result is correct, or the correct answer otherwise. Round results to three decimal places before comparing or printing them; do not print leading or trailing zeros, and do not print a decimal point when equations evaluate (or round) to an exact integer.

```
Correct
9
Correct
238.528
```