



Computer Science

34th Annual High School Programming Contest

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Gold Problem #3: Repeating Binary Fractions

Background Information: In math class, a repeating decimal pattern can be represented as a rational number in lowest terms a/b , where a, b are integers and a is non-zero. For example the repeating decimal $0.36363636\dots$ is equal to $36/99$, or $4/11$ in lowest terms. The principle is the same with repeating binary patterns (patterns in base 2 only consisting of zeros and ones).

Your program will be given the repeating binary pattern immediately following the binary point of a number. It will output the fractional, lowest terms, equivalent in base-10.

Programming Problem:

Input: A sequence of 0's and 1's that represent the repeated portion of a binary fraction up to 30 binary digits.

Output: The equivalent base-10 fraction in lowest terms, written in A/B format.

Example 1: Input:
 0011

 Output:
 1/5

Example 2: Input:
 01

 Output:
 1/3

Example 3: Input:
 0000000000011110

 Output:
 2/4369