Week 5: Assignment 5 - Question 1

Convergence depth of Collatz function

The Collatz function is defined for a positive integer n as follows.

$$f(n) = \begin{cases} 3n+1, & \text{if } n \text{ odd} \\ n/2, & \text{if } n \text{ is even} \end{cases}$$

We consider the repeated application of the Collatz function starting with a given integer n, as follows:

$$f(n),\ f(f(n)),\ f(f(f(n))),\ \ldots$$

It is *conjectured* that no matter which positive integer n you start from, this sequence eventually will have 1 in it. It has been verified to hold for numbers up to 5 × 260 [Wikipedia: Collatz Conjecture].

e.g. If n=7, the sequence is
1. f(7) = 22
2. f(f(7)) = f(22) = 11
3. f(f(f(7))) = f(11) = 34
4. f(34) = 17
5. f(17) = 52
6. f(52) = 26
7. f(26) = 13
8. f(13) = 40
9. f(40) = 20
10. f(20) = 10
11. f(10) = 5
12. f(5) = 16
13. f(16) = 8
14. f(8) = 4
15. f(4) = 2
16. f(2) = 1

Thus if you start from n=7, you need to apply f 16 times in order to first get 1.

In this question, you will be given a positive number <= 32,000. You have to output how many times f has to be applied repeatedly in order to first reach 1.

Sample Input

7

Sample Output

16