

Math 502

Written Assignment No. 1

due Monday, February 13, 2006

Directions: Use *Maple* for assistance in responding to the following problems. Please typeset your solutions. Explain what you have done. *Maple* session details are not necessary unless you think it important to include them. Accuracy is important.

Although you may refer to books and notes, you may not seek help from others on this written assignment.

Technical comments for this assignment:

- You should not find it necessary to write your own programs to do this assignment if you are familiar with those found at <http://www.math.albany.edu/~hammond/maple/>.
- The behavior of *Maple's* `convert[confrac]` appears to have changed between *Maple* 9 and *Maple* 10.

Let a and b be the integers

$$a = 30246273033735921 \quad b = 1363209853178907 .$$

Answer the following questions:

1. Compute the quotient a/b with 50 digits of precision.
2. What is the remainder upon long division of a by b ?
3. What is the greatest common divisor of a and b ?
4. What is the prime factorization of b ?
5. What number of iterations of the Syracuse function beginning with a is required to reach 1?
6. What is the largest iterate of the Syracuse function beginning with a ?
7. What is the 20th remainder found in applying the Euclidean algorithm (successive long divisions) to a and b ?
8. What are the two smallest primes found among the sequence of remainders coming from the Euclidean algorithm? N.B. The number 1 is not a prime.
9. How many integers appear in the continued fraction expansion of a/b .
10. What is the length of the repeating pattern in the decimal expansion of $208341/66317$? (This is the 7-th convergent in the continued fraction expansion of π .)