

Number Theory

Problem Set 7

Primality Tests

1. Use the repeated squaring method to compute the least residue of 2^{340} modulo 341.
2. Use the repeated squaring method to find $38^{75} \pmod{103}$.
3. Use the Fermat's little theorem to show that 91 is not a prime.
Hint: Consider the least residue of 2^{90} modulo 91.
4. Show that 91 is a pseudo prime to the base $a = 3$.
5. Use the Lucas-Lehmer test to determine if
 - (a) $M_{11} = 2^{11} - 1$ is prime.
 - (b) $M_{13} = 2^{13} - 1$ is a prime.
6. Use Péppin's test to show that $F_4 = 2^{16} + 1$ is a prime.