NUMBER THEORY: CLASS 3

1. Exercise

1) In this problem, we will learn to use maple program to solve Fibonacci identities.

i) Open the Classic Maple program.

ii) Command *rsolve* can be used to solve the recurrence relation. Try

rsolve($\{g(n) = g(n-1) + g(n-2), g(1) = 1, g(2) = 1\}, g$);

(You will obtain the formula of Fibonacci numbers).

iii) We now define the function of Fibonacci formula. Try

$f := n- > 1/sqrt(5) * (((1 + sqrt(5))/2)^n - ((1 - sqrt(5))/2)^n)$;

iv) Try the command below to solve the Fibonacci identities $f_{n+3} + f_n = 2f_{n+2}$:

simplify($f(n+3) + f(n) - 2f(n+2)$);

v) Solve the following identities

1) $f_{2n} = {f_n}^2 + 2f_{n-1}f_n$.

2) $f_{n+1}f_{n-1} - {f_n}^2 = (-1)^n$.

2) Use Sieve method to find all the prime up to 70.

3) Use the Euclidean algorithm to find gcd(58, 24) and write the gcd as a linear combination of 58 and 24.

Date: Friday, September 5, 2008.