MATH N55 HOMEWORK 4
DUE TUESDAY, JULY 9TH

Do the following problems in Rosen. You may assume the Fundamental Theorem of Arithmetic, even though we have not proved it yet.

Section 4.1: 11, 12, 17, 30, 43
Section 4.3: 4, 5, 11, 32, 49

Challenge (Not to be handed in)

Give an upper bound for the number of steps the Euclidean algorithm must take, in terms of the sizes of a and b. As an extra challenge, verify that your bound is tight (i.e. that there is no smaller upper bound).
Hint: The Fibonacci numbers are the sequence

$$0, 1, 1, 2, 3, 5, 8, 13, 21, \ldots$$

defined by $F_0 = 0$, $F_1 = 1$, and $F_n = F_{n-1} + F_{n-2}$ for $n \geq 2$. What happens when you compute the GCD of two consecutive Fibonacci numbers? Can you show that this is in some sense the worst possible case?