Number Theory II
Fall 2010

Assignment 11.2
Due November 10

Exercise 1. Chapter 6, #14

Exercise 2. Chapter 6, #15

Exercise 3. Chapter 6, #17. Suggestions:

- **a.** At the outset, it's not a bad idea to prove that if f has period k and $a, m \in \mathbb{N}$ then $f(m + ak) = f(m)$ (use induction on a).
- **b.** For part (a), use the division algorithm to divide k_0 into k, and use the fact above to help you show that the remainder is also a period of f, and hence equal to zero (why?).
- **c.** For part (b), show first that if $k > 1$ (the result is trivial if $k = 1$) then f is not constant. By considering values of f at multiples of k, use multiplicativity and periodicity to show that $f(k) = 0$.
- **d.** Finally, show that if $k = ab$ and $f(b) \neq 0$ then a is a period of f. Use this to prove that $f(d) = 0$ for all divisors of k other than 1.