MATH 2500 Assignment #3

Due: March 19, 2014, Before Class (12:30)

Reminder: all assignments *must* be accompanied by a signed copy of the honesty declaration available on my website.

Assignments are to be handed in on $8\frac{1}{2} \times 11$ paper, single sided, no ragged edges, stapled in the top left hand corner with the honesty declaration as the first page.

1. Each of the following $[n, e]$ represent the public information for an RSA encryption. Solve for the decrypt key d.

   (a) $[3053, 2321]$

   (b) $[2993, 227]$

   (c) $[3233, 1013]$

2. Find the next seven (7) entries in the aliquot sequence starting with s_0 if

   (a) $s_0 = 105$.

   (b) $s_0 = 445$.

   (c) $s_0 = 5020$.

3. (a) Suppose n is an 3-perfect number and $(n, 12) = 1$. Is $12n$ k-perfect number? If so, for what k?

   (b) Suppose n is an 7-perfect number and $(n, 14) = 1$. Is $14n$ k-perfect number? If so, for what k?

   (c) Suppose p is a prime and n is an p-perfect number and $(n, p) = 1$. Is pn k-perfect number? If so, for what k?

4. (a) Show that if n is odd, then $\phi(2n) = \phi(n)$.

   (b) Show that if n is even, then $\phi(2n) = 2\phi(n)$.

   (c) In terms of $\phi(n)$, what are the possible values of $\phi(3n)$, and under what conditions do they occur?

   (d) Find all values of n such that $\phi(2n) = \phi(3n)$.