MATH 2500 Assignment #1

Due: January 30, 2013, 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. Use induction to prove the following

$$3 + 7 + 11 + 15 + \cdots + (12n - 1) = 3n(6n + 1).$$

2. Use induction to prove the following

$$(2n + 1) + (2n + 3) + (2n + 5) + \ldots + (4n + 1) = (3n + 1)(n + 1).$$

3. Use the Euclidean Algorithm to find $(10017, 4480)$ and then find integer values for x and y such that $10017x + 4480y = (10017, 4480)$.

4. (a) Find the prime power decompostion of the following numbers:
   - i. 110880
   - ii. 149600
   - iii. 1126125.

   (b) Use the results of part (a) to find:
   - i. $(110880\,,\,149600)$
   - ii. $(110880\,,\,1126125)$
   - iii. $(149600\,,\,1126125)$.

5. Prove (using the appropriate definitions, theorems and/or lemmas from the text) :

   (a) If $c \mid ab$ and $(c, a) = d$, then $c \mid db$.

   (b) If d is odd and $d \mid (a + b)$ and $d \mid (a - b)$, then $d|(a, b)$.