# MATH 2500 Assignment #1

Due: January 29, 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. Use induction to prove the following

$$2 + 5 + 8 + 11 + \cdots + (12n - 1) = 2n(12n + 1).$$

2. The Fibonacci numbers are defined by

$$f_{n+1} = f_n + f_{n-1} \ ; \ \ f_1 = f_2 = 1.$$

   Use induction to prove that $f_{4n}$ is divisible by 3.

3. Use the Euclidean Algorithm to find $(5556, 1062)$ and then find integer values for $x$ and $y$ such that $5556x + 1062y = (5556, 1062)$.

4. (a) Find the prime power decomposition of the following numbers:
      i. 147420
      ii. 184800
      iii. 282744.
   (b) Use the results of part (a) to find:
      i. (147420 , 184800)
      ii. (147420 , 282744)
      iii. (184800 , 282744).

5. Prove (using the appropriate definitions, theorems and/or lemmas from the text) :
   (a) If $a \mid b$ and $c \mid d$ then $ac \mid bd$.
   (b) If $a \mid c$ and $b \mid c$ and $(a, b) = d$, then $ab \mid cd$.