Math 235
Written Assignment 2

Solutions to the problems below are due at the beginning of class on Wednesday, April 15th. Please follow the guidelines in the course policy handout when completing this assignment.

1. Solve the following puzzle from ninth century India: There were 63 piles of of plantains put together with 7 single plantains. The plantains were divided evenly among 23 travelers. What is the number of plantains in each pile? (*Use complete sentences to write up your solution. Examples of how to do so are on pp. 35-37 of your text.*)

2. When Mr. Smith cashed a check at his bank, the teller mistook the number of cents for the number of dollars and vice-versa. Unaware of this, Mr. Smith spent 68 cents and then noticed to his surprise that he had twice the amount of the original check. Determine the smallest value for which the check could have been written. (*As in 1, use complete sentences to write up your solution.*)

3. Prove that any prime number of the form $3n+1$ where $n \in \mathbb{N}$ is also of the form $6m+1$ for some $m \in \mathbb{N}$.

4. Given that p is a prime number, $a, n \in \mathbb{N}$, and $p|a^n$, prove that $p^n|a^n$.

5. Let $k \in \mathbb{N}$, $k \neq 2$. Prove that if $2^k - 1$ is a prime number, then k must be odd.

6. Prove that if $\gcd(a, b) = 1$, then $\gcd(a + b, ab) = 1$.