Math 4100 Quiz 2

Name:_____

1. There were 63 equal piles of plantain plus 7 individula fruits. The fruit was divided eveny among 23 people. How many pieces of fruit were there?

2. A farmer purchased 100 head of livestock for 4000.00. The prices were as follows \$120 for a cow \$50 for a lamb and \$25 for a piglet. FInd out how many of each he bought.

3. Prove any integer of the form $3n + 2$ has a prime factor of the form $3m + 2$. (3.1.3b)

4. Prove the only prime, p, for which $3p + 1$ is a perfect square is $p = 5$. (3.1.3d)

5. Prove there are infinitely may primes.

6. Prove $\sqrt{5}$ is irrational.

7. Let p be a prime and assume $p \not| b$. Show that in the following progression taht every pth term is divisible by p:

$$a, a + b, a + 2b, a + 3b, a + 4b, a + 5b, \ldots$$

   Hint: Use $\gcd(p, b) = 1$ to get $ax + by = 1$ show p divides $a + (kp - ay)b$ where k is any integer. (3.2.18)

8. If $a \equiv b \mod n$ and $c \equiv d \mod n$ then $a + c \equiv b + d \mod n$.

9. If $a \equiv b \mod n$ and $c \equiv d \mod n$ then $ac \equiv bd \mod n$.

10. Assume $a^2 \equiv b^2 \mod n$. Show by a counterexample that $a \equiv b \mod n$ need not be true.

11. Show $39|53^{103} + 103^{53}$.

12. (4.2.12)

13. (4.3.9)

14. (4.3.10)