ASSIGNMENT 5 ECE 103 (Spring 2009)

Due in tutorial on Monday, June 22.

1. (a) What is the prime factorization of 78204?

   (b) How many positive divisors does 78204 have?

2. Let p be a prime number, and let $a, b \in \mathbb{Z}$.

   (a) Prove that if $a^2 \equiv b^2 \pmod{p}$, then $a \equiv \pm b \pmod{p}$.
       (In other words, $a \equiv b \pmod{p}$ or $a \equiv -b \pmod{p}$.)

   (b) Disprove the statement "If $a^4 \equiv b^4 \pmod{p}$, then $a \equiv \pm b \pmod{p}$".

3. Solve each of the following linear congruences:

   (a) $715x \equiv 143 \pmod{1881}$

   (b) $1785x \equiv 143 \pmod{1881}$

4. Solve the polynomial congruence $x^2 \equiv 5x + 6 \pmod{12}$.