# MATH 2500 Assignment #2

Due: October 12, 2012, Before Class (9:30)

*Reminder:* all assignments *must* be accompanied by an honesty declaration available on my website.

1. For each of the following linear Diophantine equations, find all integer solutions for $x$ and $y$:
   (a) $1785x + 5572y = 28$
   (b) $4029x + 4473y = 22$
   (c) $803x + 5854y = 3$

2. For each of the following linear modular congruences, find all solutions:
   (a) $214x \equiv 33 \pmod{465}$
   (b) $1841x \equiv 27 \pmod{6426}$
   (c) $64x \equiv 28 \pmod{276}$
   (d) $329x \equiv 38 \pmod{5645}$

3. For each of the following systems of linear modular congruences, find all solutions: (solutions for these should be least residues $\pmod{m_1 \cdot m_2 \cdots m_k}$.)
   (a) $x \equiv 6 \pmod{13}$
   $x \equiv 3 \pmod{7}$
   $x \equiv 12 \pmod{38}$
   (b) $x \equiv 46 \pmod{117}$
   $x \equiv 7 \pmod{91}$
   (c) $x \equiv 22 \pmod{51}$
   $x \equiv 54 \pmod{119}$

4. If $1862 \equiv 2863 \pmod{m}$ is a true statement, then what are the possible values of $m$?

5. For each of the statements, if the statment is true, then prove it; if the statement is not true, give a counterexample.
   (a) If $a \equiv b \pmod{m}$ then $a^2 \equiv b^2 \pmod{m^2}$.
   (b) If $d|m$ and $a \equiv b \pmod{m}$, then $a \equiv b \pmod{d}$.
   (c) If $a^2 \equiv b^2 \pmod{p}$, then $a \equiv b \pmod{p}$, where $p$ is a prime.