Midterm 2 / 2010.11.29 / MAT 3233.001 / Modern Algebra

Name: ______________________________

Please show all work.

1. Partition U_{19} into cosets of $\langle 12 \rangle$.
2. If G is a commutative group and $H < G$, prove that $x, y \in G$ give the same coset of H (i.e. $xH = yH$) exactly when $xy^{-1} \in H$.
3. If $[x]_m \in \mathbf{Z}_m$, show that $\langle x \rangle = \mathbf{Z}_m$ exactly when $[1]_m \in \langle x \rangle$. Then show that this happens exactly when x is coprime to m.

   [Hint: Bezout]
4. Find the solution set for the system of congruences

$$8x \equiv 2 \bmod 18$$

$$9x \equiv 28 \bmod 30$$

5. Exhibit an injective group homomorphism from U_7 to S_7.

1	2	3	4	5	total (50)	%

Prelim. course grade: %