**MTH 361**
**Quiz 10**
**Spring 2010**

20 points possible. Your work must justify your answer.

**1.** (5 pts.) Find the order of the factor group $(\mathbb{Z}_4 \times \mathbb{Z}_8)/\langle(2,2)\rangle$.

**2.** (5 pts.) Find the order of the element $(1,1) + \langle(1,2)\rangle$ in the factor group $(\mathbb{Z}_3 \times \mathbb{Z}_4)/\langle(1,2)\rangle$.

**3.** (5 pts.) Classify the group $(\mathbb{Z}_2 \times \mathbb{Z}_4)/\langle(0,3)\rangle$ according to the fundamental theorem of finite abelian groups.

[As usual, your final answer should be in the form $\mathbb{Z}_{(p_1)^{r_1}} \times \mathbb{Z}_{(p_2)^{r_2}} \times \ldots \mathbb{Z}_{(p_n)^{r_n}}$, where the $p_i$ are (not necessarily distinct) primes and the $r_i$ are positive integers.]

**4.** (5 pts.) Classify the group $(\mathbb{Z}_4 \times \mathbb{Z}_4)/\langle(2,3)\rangle$ according to the fundamental theorem of finite abelian groups.

[As usual, your final answer should be in the form $\mathbb{Z}_{(p_1)^{r_1}} \times \mathbb{Z}_{(p_2)^{r_2}} \times \ldots \mathbb{Z}_{(p_n)^{r_n}}$, where the $p_i$ are (not necessarily distinct) primes and the $r_i$ are positive integers.]