MATH 113, QUIZ #7 Thursday, October 8

- 1. (3 points each) GIVE AN EXAMPLE For each of the following problems, give a SPECIFIC example of the algebraic object. No justification is required, but be sure that your choices clearly meet the conditions required.
 - (a) Two nonisomorphic index 2 subgroups of D_8 .
 - (b) A group G and a subgroup $H \leq G$ so that |H| = 6 and there are 7 left cosets of H in G.
 - (c) An infinite group G and an infinite subgroup $H \leq G$ such that there are infinitely many left cosets of H in G.
 - (d) A nonabelian group containing at least 50 elements, all of which have order 1, 2, 3, or 6.
 - (e) Two nonisomorphic order 12 subgroups of $\mathbb{Z}_{36} \times \mathbb{Z}_{24}$.

- (f) A subgroup H of $\mathbb{Z}_4 \times \mathbb{Z}_8$ which is NOT of the form $H = A \times B$, where $A \leq \mathbb{Z}_4$ and $B \leq \mathbb{Z}_8$.
- (g) Two different products of cyclic groups (use \mathbb{Z}_n 's, not other cyclic groups you happen to know) which are isomorphic to $\mathbb{Z}_{36} \times \mathbb{Z}_{50}$. (Not including the given product, and don't just reorder factors.)
- (h) A group with at least 10 different elements of order 5.

2. (6 points) The following table is a group table for a group G of order 8 of an isomorphism type we have not encountered yet. (It's called the quaternion group.) Show that G is not isomorphic to any abelian group of order 8 or to D_4 and justify your answer.

	1	-1	i	-i	j	-j	k	-k
1	1	-1	i	-i	j	-j	k	-k
-1	-1	1	-i	i	-j	j	-k	k
i	i	-i	-1	1	k	-k	-j	j
-i	-i	i	1	-1	-k	k	j	-j
j	j	-j	-k	k	-1	1	i	-i
-j	-j	j	k	-k	1	-1	-i	i
k	k	-k	j	-j	-i	i	-1	1
-k	-k	k	-j	j	i	-i	1	-1