

**MTH 361**  
**Quiz 4**  
**Spring 2010**

Take home quiz. Due before class on March 17. You may get help from anyone, anywhere, except me. You must write up your own results independently. (That is, you can get help from someone else, but you can't just copy.) 20 points possible.

1. (5 pts.) Find all subgroups of the group  $\mathbb{Z}_{30}$ , and draw the subgroup diagram for the subgroups.

2. (5 pts.) Draw a Cayley digraph of the group  $\mathbb{Z}_{14}$  using the generating set  $\{6, 7\}$ .

3. (5 pts.) Describe *all* group isomorphisms  $\phi : \mathbb{Z}_{14} \rightarrow U_{14}$  by giving the possible values for  $\phi(1)$ .

4. (5 pts.) Let  $H$  and  $K$  be subgroups of a group  $G$ . Define  $\sim$  on  $G$  by  $a \sim b$  if and only if  $a = hbk$  for some  $h \in H$  and some  $k \in K$ . Prove that  $\sim$  is an equivalence relation on  $G$ .