Russ Johnson
Reading Assignment 5
January 28, 2013

For Activity 21.1 we looked at the nontrivial subgroup H of the cyclic group $\mathbb{Z}_{100}$. The smallest number of elements of the subgroup H containing [20] is 5. In this case the subgroup $H = \{[0], [20], [40], [60], [80]\}$. It should be noted that $5[20] = [0]$. For all finite cyclic groups equal to $\langle a \rangle$ with identity e and cardinality n, $na = e$. This is true of H, because it is also a cyclic group. We will see later that all subgroups of cyclic groups are cyclic groups themselves. There are other subgroups of $\mathbb{Z}_{100}$ containing [20] besides the group with cardinality 5. One example is the group $\{[0], [10], [20], [30], [40], [50], [60], [70], [80], [90]\}$. This subgroup of $\mathbb{Z}_{100}$ is equal to $\langle [10] \rangle$ and [20] is divisible by [10]. There is also the subgroup of $\mathbb{Z}_{100}$ equal to $\mathbb{Z}_{100}$, which will also contain [20]. Overall, the goal of this activity is to look at subgroups of cyclic groups and the properties that these subgroups have. Describing all subgroups of a group is sometimes difficult, but cyclic groups have simpler subgroup structures and can be investigated more throughly than other subgroups.