Math 541
Modern Algebra
A first course in Abstract Algebra
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University of Wisconsin-Madison
Mathematics Department

Homework 5: Due October 10, 2007

1. Let $d \in \mathbb{Z}_{\geq 0}$. Show that the set $d\mathbb{Z}$ of multiples of d is a subgroup of $\mathbb{Z}$.
2. Show that if H is a subgroup of $\mathbb{Z}$ then there exists a positive integer d such that $H = d\mathbb{Z}$.
3. Let d_1 and d_2 be positive integers. Show that $d_2\mathbb{Z} \subseteq d_1\mathbb{Z}$ if and only if d_1 divides d_2.
4. Make a list of all the subgroups of $\mathbb{Z} / 110\mathbb{Z}$.
5. Make a list of all the subgroups of the Klein 4 group.
6. Make a list of all the subgroups of the symmetric group S_3.