

ABSTRACT ALGEBRA #1

DUE ON SEPTEMBER 14, 2018

Instructions. Please complete problems totaling at least 20 points. You do not need to complete all problems listed, although doing so will help you learn the material and prepare you better for the final exam. You may collaborate with any students currently enrolled in the course, although you must write up your own work and give credit to people and sources which aided you. The assignment is due on or before September 14, 2018, either turned into the class mail box or handed in at the beginning of class.

Problem 1 (5 points). Prove that all subgroups of an abelian group must be normal.

Problem 2 (5 points). Prove that if \mathbb{Z}_n is a field, then n must be prime power.

Problem 3 (10 points). Prove that if G is a cyclic group then all subgroups of G are cyclic as well.

Problem 4 (10 points). Let G be a group and p be a prime divisor of $|G|$. Prove that G must contain an element of order p .

Problem 5 (5 points). Prove that there are no finite simple groups of order 56.