Chris Bendel and Peter Cholak Math 222 - Quiz 12 Friday, April 23

Be sure to carefully write up your answers. It is suggested that you first write out a draft of your proposed questions and then carefully rewrite that draft to get your final version. You do *not* have to write the answers on this sheet of paper.

Consider the subgroup $A_4 \subset S_4$ of even permutations. For each of the following integers, determine whether $A_4$ has a subgroup of that order. If so, explicitly exhibit a such a subgroup and if not, explain why not.

a) 2

b) 5

c) 3

d) 4

e) 8

(Section 9.4, Problem 42.) Suppose that $H$ is a subgroup of $G$ and $g$ is an element of $G$. Prove that the set

$$gHg^{-1} = \{ghg^{-1} : h \in H\}$$

is a subgroup of $G$ and is isomorphic to $H$.

(Section 9.5, Problem 25.) Prove that a group has exactly 2 subgroups iff it is isomorphic to $(\mathbb{Z}_p, +)$ for some prime $p$.