Modern Algebra
Spring 2023

Assignment 3.2
Due February 1

Exercise 1. Let G and H be groups. If $g \in G$ and $h \in H$ both have finite order, show that in $G \times H$ one has

$$|(g, h)| = \operatorname{lcm}(|g|, |h|).$$

Exercise 2. Lang, exercise II.1.13.

Exercise 3. If G is a group and $\{H_i \mid i \in I\}$ is a collection of subgroups of G, prove that

$$\bigcap_{i \in I} H_i$$

is a subgroup of G. That is, an (arbitrary) intersection of subgroups of G is again a subgroup of G.

Exercise 4. Show that the subset R of rotations in D_n is a subgroup of D_n. Which subgroups of D_n contain only the identity and flips?