

HOMEWORK 2 (DUE: 11:15 AM, SEP 26 WED)

1. Do Exercise 4.H.1–8. in [Pin10, p. 43].
2. Do Exercise 5.B.1–6. in [Pin10, p. 49].
3. Do Exercise 5.C.1–7. in [Pin10, p. 49]. For 5.C.7, you do not need to prove it – just explain why you think that 5.C.4–6 may not be true for nonabelian groups. (Of course you can give a counterexample to each statement, but it is not required.)
4. [Fra02, Exercise 7.1–6] In each case, describe the subgroup generated by the given subset. Here the operation on each group is given by $+$. (You do not need to justify your answers.)
 - a) $\{2, 3\} \subset \mathbb{Z}_{12}$
 - b) $\{4, 6\} \subset \mathbb{Z}_{12}$
 - c) $\{8, 10\} \subset \mathbb{Z}_{18}$
 - d) $\{12, 30\} \subset \mathbb{Z}_{36}$
 - e) $\{12, 42\} \subset \mathbb{Z}$
 - f) $\{18, 24, 39\} \subset \mathbb{Z}$
5. [Sar08, Exercise 5.18.a)] Show that it is impossible for a group G to be the union of two *proper* subgroups, i.e. if there exist two subgroups $H, K \subset G$ such that $H \cup K = G$, then either $H = G$ or $K = G$.

REFERENCES

- [Fra02] Fraleigh, J. B., *A First Course in Abstract Algebra*, 7th ed., Pearson, 2002.
[Pin10] Pinter, C. C., *A Book of Abstract Algebra*, 2nd ed., Dover Publications, 2010.
[Sar08] Saracino, D., *Abstract Algebra: A First Course*, 2nd ed., Waveland Press, 2008.