

There are partial solutions to some of Gallian textbook exercises, at the back of the book.

1. FROM THE TEXTBOOK

- (1) Read Gallian Chapter 7 pg 138-140 (including Examples 1, 2, 3, and the 9-item lemma). Then paraphrase the last paragraph of page 140.
- (2) Do Gallian Textbook Chapter 7 Exercise 1 (pg 150).
- (3) Do Gallian Textbook Chapter 7 Exercise 2 (pg 150).
- (4) Do Gallian Textbook Chapter 7 Exercise 3 (pg 150).
- (5) Read Gallian Chapter 7 Example 4 (pg 141). Then do a similar computation: Gallian Textbook Chapter 7 Exercise 5 (pg 150).
- (6) Paraphrase (or copy word-for-word):
 - Chapter 7 Theorem 7.1 (Lagrange's Theorem) and its proof (pg 142).
 - Chapter 7 Corollaries 1, 2, 3 and their proofs (pg 143).

2. COSET PROPERTIES

Theorem 1. Suppose H is a subgroup of a group G , and $a, b \in G$. Then the following conditions are equivalent.

- (i) $aH = bH$
- (ii) $aH \subset bH$
- (iii) $b \in aH$
- (iv) $a^{-1}b \in H$

The already-typed proofs in Typesetting Project 05 show that (ii) implies (i) and also that (iv) implies (iii), and your Overleaf assignment was to type a proof showing (iii) implies (ii). To complete the proof of this theorem, we only need to show (i) implies (iv).

Your homework problem: Prove that (i) implies (iv). Suppose $aH = bH$. Prove that $a^{-1}b \in H$.