

MATH 6/71051
Homework #4
Due: Thursday, September 27

Reading:

For Tues., September 25: §3.3

For Fri., September 28: §3.5

Problems to turn in:

§2.4: 14, 17.

§3.1: 23, 25, 42.

§3.2: 7, 18, 19, 20.

I. Let $H \leq K \leq G$.

- (a) Let $\{k_i \mid i \in I\}$ be a left transversal of H in K . Let $\{g_j \mid j \in J\}$ be a left transversal of K in G . Show that $\{g_j k_i \mid i \in I, j \in J\}$ is a left transversal of H in G .
- (b) Use (a) to show that $|G : H| = |G : K| \cdot |K : H|$.

Notes:

- For §2.4 #17, you will need the definition of *maximal subgroup* (see §2.4 #16) and Zorn's Lemma (see Appendix I, Part 2). Only the definitions and through the statement of Zorn's Lemma are required.
 - On Problem #I, do NOT assume that the indices are finite.
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Problems to be aware of:

§2.4: **1**, **2**, 3, 16.

§2.5: 3, 6, 8, **10**.

§3.1: **1**, **22**, 24, 26, 27, 28, 29, **30**, **31**.

§3.2: **5**, 6, **8**, **12**, 16, 22.

[Problems in **bold** contain results we will assume and use in the course.]