

Homework 7

MATH 301

Due Wednesday, November 1, 2023

Instructions. Read the [Homework Guide](#) to make sure you understand how to successfully complete the assignment. All claims must be sufficiently justified.

Exercise 1. Complete the following exercises from [Section 5.4](#) in the course textbook:

9, 14, 37(a,b)

Exercise 2. Complete the following exercises from [Section 6.5](#) in the course textbook:

1, 3, 4, 5 (all except g.), 6, 8, ***12**, ****15**, 17, ***18**

***Exercise 3.** Let H be a subgroup of a group G . Fix $g \in G$, and define $\varphi_g: H \rightarrow gH$ by $\varphi_g(h) = gh$. Prove that φ_g is a bijection.

****Exercise 4.** Prove that the symmetry group of the unit cube is S_4 (Hint: record how the elements permute the 4 interior diagonals of the cube.)

****Exercise 5.** Prove that the symmetry group (or *automorphism group*) of the Petersen graph is S_5 (see [Wikipedia](#) for definition of Petersen graph).