

Math 371 Homework#1

Due on 1/24 at the beginning of Lecture

1. Let H and K be two subgroups of group G . Prove that $H \cap K$ is a subgroup of G .

2. In the lecture, we gave a subgroup of symmetric group S_n . When $n = 3$, let

$$S = \{x \in S_3 | x(3) = 3\}$$

Prove that S is not a normal subgroup of S_3 .

3. (Artin, Chapter 2, Exercise 6.1) Let G' be the group of real matrices of the form

$$\begin{bmatrix} 1 & x \\ & 1 \end{bmatrix}.$$

Is the map $\mathbb{R}^+ \rightarrow G'$ that sends x to this matrix an isomorphism?

4. (Artin, Chapter 2, Exercise 7.1) Let G be a group. Prove that the relation $a \sim b$ if $b = gag^{-1}$ for some g in G is an equivalence relation on G .