University of Bahrain
Department of Mathematics
MATHS311: Abstract Algebra 1
Fall 2017
Dr. Abdulla Eid

Homework 9: Group Homomorphism
Due on December 14
Hand all the problems

Name: _____

1. Show that the map

$$\begin{aligned} \varphi : (\mathbb{R}, +) &\to (\mathbb{R}_{>+}, \cdot) \\ x &\mapsto 2^x \end{aligned}$$

is an isomorphism of groups.

2. Let G be a group. Consider the map

$$\begin{aligned} \varphi : G &\to G \\ g &\mapsto g^{-1} \end{aligned}$$

Show that φ is a group homomorphism if and only if G is abelian.

3. Let $\varphi : G \to G'$ and $\psi : G' \to G''$ be group homomorphisms. Show that $\psi \circ \varphi : G \to G''$ is a group homomorphism.

4. Let $\varphi : G \to G'$ be a group homomorphism. Let H be a cyclic subgroup of G. Show that $\varphi(H)$ is a cyclic subgroup of G'.