March 10, 2015 Lecturer Dmitri Zaitsev Hilary Term 2015

Course 1214 - Introduction to group theory 2015

Sheet 7

Due: at the end of the lecture

Exercise 1

(i) Prove that f is a homomorphism, where $f\colon \mathbb{Z} \to \mathbb{Z}_n$, $f(a) = [ka]$, for integer k;

(ii) Prove that there is unique homomorphism $f\colon \mathbb{Z}_6 \to S_3$ with $f([1]) = (321)$.

Exercise 2

(i) Prove that a composition of two group homomorphisms is a group homomorphism.

(ii) Prove that homomorphic image of a cyclic group is cyclic.

Exercise 3

Find all homomorphisms:

(i) $f\colon \mathbb{Z}_2 \to \mathbb{Z}_4$,

(ii) $f\colon \mathbb{Z}_2 \to \mathbb{Z}_5$.