

Course 1213 - Introduction to group theory 2016

S h e e t 7

Due: at the end of the tutorial

Exercise 1

- (i) Prove that for every integer k ,

$$f: \mathbb{Z} \rightarrow \mathbb{Z}_n, \quad a \mapsto [ka]$$

is a group homomorphism;

- (ii) Find all homomorphisms $f: \mathbb{Z}_6 \rightarrow S_3$ (where S_3 is the symmetric group).

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) $f: \mathbb{Z}_2 \rightarrow \mathbb{Z}_6$,
(ii) $f: \mathbb{Z}_3 \rightarrow \mathbb{Z}_5$.