

Prof. Dr. Sándor Fekete  
Nils Schweer

## Coding Theory / Discrete Mathematics II Assignment 2 (May 04, 2006)

(This assignment is due on May 11, 2006, 1.00 p.m., by dropping it into the wooden box  
in front of F 310)

### Exercise 1 (Ring):

Let  $(R, +, \cdot)$  be a ring and 0 the (additive) neutral element.

- a) Show that  $r \cdot 0 = 0$  for every  $r \in R$ .
- b) Show that  $(-a)b = -(ab)$  for every  $a, b \in R$ .

(30 Points)

### Exercise 2 (Field):

Show that  $(\mathbb{Z}_3, +, \cdot)$  is a field.

( $\mathbb{Z}_3$  consists of the elements 0,1 and 2. Addition and multiplication are defined modulo 3,  
e.g.,  $2 + 1 = 0$ ,  $2 \cdot 2 = 1$ .)

(30 Points)