

PHILADELPHIA UNIVERSITY  
DEPARTMENT OF BASIC SCIENCES

Exam 1

Abstract Algebra 2

06–04–2016

1. Let  $S = \left\{ \begin{pmatrix} x & y \\ x & y \end{pmatrix} \mid x, y \in \mathbb{R} \right\}$ . Prove that  $S$  is a subring of  $M(2, \mathbb{R})$ .
2. Draw the two Cayley tables for the factor ring  $R/I$ , where  $R = \mathbb{Z}_2 \times \mathbb{Z}_6$  and  $I = ((0, 2))$ .
3. Let  $R$  be a finite integral domain. Prove that  $R$  is a field.
4. Let  $R$  be a commutative ring, and let  $x \in R$ . Let  $S = \{a \in R \mid ax = 0\}$ . Prove that  $S$  is an ideal of  $R$ .

–Amin Witno