

Homework 3 (Math462)

Problem 1 (2 points)

Let R be an arbitrary ring and let

$$S = \{x \in R \mid ax = xa \text{ for all } a \in R\}.$$

Prove that S is a subring of R .

Problem 2 (8 points)

Let $\left\{ \begin{pmatrix} x & 0 \\ x & 0 \end{pmatrix} \mid x \in \mathbb{R} \right\} \subset M_{2 \times 2}(\mathbb{R})$.

- (i) Prove that S is a subring of $M_{2 \times 2}(\mathbb{R})$.
- (ii) Is S a commutative ring?
- (iii) Does S have a unity?
- (iv) Does every non-zero element of S have an inverse?