University of Bahrain
Department of Mathematics
MATHS312: Abstract Algebra II
Spring 2018
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Homework 3: More on Subrings
Due on March 15, 2018
Hand in all problems

Name: ______________________________

1. Show that in a ring R, we have $(-a)(-b) = ab$.

2. Let S_1, S_2 be two subrings of a ring R. Show that $S_1 \cap S_2$ is also a subring of R.

3. Show that $2\mathbb{Z} \cup 3\mathbb{Z}$ is **not** a subring of $\mathbb{Z}$.

4. Let R be a commutative ring with unity 1_R. Consider the set

$$S := \{n \cdot 1_R \mid n \in \mathbb{Z}\}$$

Show that S is a subring of R. What is the unity of S?

5. Show that if $(R, +)$ is cyclic group, then R is a commutative ring.

6. Suppose R is a ring and that $a^2 = a$ for all $a \in R$. Show that R is commutative (such rings are called **Boolean** rings).
(Hint: Show that $-1 = 1$ and find $(a + b)^2$)

7. Show that the centralizer of an element in a ring is a subring.