MATH 4360 Foundations of Algebra, Spring 2018

Homework I - Due in class Friday, 2 February 2017

1. Let R be the set of real numbers $\mathbb{R}$, with the following operations:

$$a \oplus b := a + b + 2;$$

$$a \otimes b := ab + 2a + 2b + 2.$$

for all $a, b \in \mathbb{R}$.

(a) Is $(R, \oplus, \otimes)$ a ring?

(b) Is R commutative?

(c) Does R have an identity?

2. Let R be the set of positive real numbers $\mathbb{R}^+$, with the following operations:

$$a \oplus b := ab;$$

$$a \otimes b := a^{\ln b}.$$

for all $a, b \in \mathbb{R}^+$.

(a) Is $(R, \oplus, \otimes)$ a ring?

(b) Is R commutative?

(c) Does R have an identity?