

**Math 356 Assignment 1: Due Wednesday, January 21**

Do the following problems from the text:

§1.2 6,8,34,36

1) Consider two-by-two real matrices  $M_2(\mathbb{R})$  under the binary operation of matrix multiplication. Show this is associative.

2) Consider  $M_2(\mathbb{R})$  under the *commutator* operation

$$A * B = AB - BA \quad (\text{usually denoted } [A, B]).$$

Decide whether this is associative and commutative; prove your answer.

3) Let  $S = \{a, b\}$  be a set with two elements. Write multiplication tables for all the possible binary operations on  $S$ . Indicate which are associative and commutative. Are there any commutative operations which are not associative? Indicate which operations are isomorphic.

4) Let  $S$  be a set with  $n$  elements. How many different binary operations are defined on  $S$ ?