MA535 ALGEBRA
W. J. Martin
September 1, 2015

Assignment 1

DUE DATE: Tuesday, September 8 at the beginning of class.

Please carefully review Dr. Martin's assignment presentation rules on the back of this sheet.

Provide neat and careful solutions to the following five problems:

1. Build the Cayley table for the group of points on the elliptic curve

$$\mathcal{C} \ : \ \ y^2 = x^3 + x + 4$$

over the field $\mathbb{F}_7$ of integers modulo seven. Explain your steps, make a diagram of the vector space, and clearly label the group elements on the graph of this curve.

2. (a) Prove that the set $G = \{x \in \mathbb{R} \mid -1 < x < 1\}$ forms an abelian group under the operation

$$x \star y = \frac{x+y}{1+xy} \ .$$

(b) Find an operation on the set $(0, 1)$ of real numbers in the open unit interval which makes $(0, 1)$ into a group.

3. Ex. 13 on p22.

4. Ex. 12 on p28.

5. Ex. 18 on p28.

BASIC RULES FOR ALGEBRA ASSIGNMENTS

I) Each student must compose his/her assignments independently. However, rough work may be done in groups;

II) Write legibly and use only one side of each sheet of paper;

III) Show your work. Explain your answers using FULL SENTENCES;

IV) Late assignments will not, in general, be accepted for credit.