Homework 2

Math 415 (section 502), Fall 2015

This homework is due on Thursday, September 10. You may cite results from class, as appropriate.

0. Read Sections 0 and 2.

1. Let $C([0,1])$ denote the set of all continuous functions from the interval [0,1] to $\mathbb{R}$.

   (a) Is $C([0,1])$ a countably infinite set?

   (b) Is $(C([0,1]), \cdot)$ a group? If so, is it abelian? Prove your answer. (Here, $\cdot$ is usual multiplication of functions: $(f \cdot g)(x) := f(x) \cdot g(x)$.)

   (c) Is $(C([0,1]), -)$ a group? If so, is it abelian? Prove your answer. (Here, $-$ is subtraction.)

   (d) Is $(C([0,1]), +)$ a group? If so, is it abelian? Prove your answer. (Here, $+$ is addition.)

   (e) Consider the following relation on $C([0,1])$: a function f is related to g if (and only if) $|f(0) \cdot g(0)| = 1$. Is this an equivalance relation? Prove your answer.

   (f) Consider the following relation on $C([0,1])$: a function f is related to g if (and only if) $|f(0)| = |g(0)|$. Is this an equivalance relation? Prove your answer.

2. Section 0 # 18, 26, 28

3. Section 2 # 8, 24, 26, 28

4. (These problems are suggested problems – *not* to be turned in.)

   (a) Section 0 # 12, 30, 32, 14c

   (b) Section 2 # 8