Math 330 Section 5 - Spring 2022 - Homework 04

Published: Tuesday, February 08, 2022 *Running total:* 19 *points*
Last submission: Friday, February 25, 2022

Status - Reading Assignments:

Here is the status of the reading assignments you were asked to complete by this date.

MF lecture notes:
ch.2.1 - 2.3, ch.3, skim ch.4, ch.5 - 5.2.3

B/G (Beck/Geoghegan) Textbook:
ch.1, ch.2.1 - 2.2, ch.3

B/K lecture notes:
ch.1.1 (Introduction to sets) (optional)
ch.1.2 (Introduction to Functions) but skip ch.1.2.4: Floor and Ceiling Functions (optional)

New reading assignments:

Reading assignment 1 - due Monday, February 14:

- **a.** Carefully read MF ch.5.2.4 – 5.2.7. A solid understanding of ch.5.2.4 and 5.2.5 is crucial for the remainder of the course.
- **b.** Read the very short B/G ch.5 on sets and functions. You have encountered all of it in MF ch.2.1-2.3 and MF ch.5.1-5.2.2.

Reading assignment 2 - due Wednesday, February 16:

- **a.** Carefully read the remainder of MF ch.5. BEWARE: ch.5.2.8 is hard to digest!
- **b.** Carefully read MF ch.6.1 and ch.2.4.

Reading assignment 3 - due Friday, February 18:

- **a.** Carefully read B/G Ch.2.3.
- **b.** First review group homomorphisms in the addenda to MF ch.3, then read carefully MF ch.6.2.

Written assignments are on the next page.

General note on written assignments: Unless expressly stated otherwise, to prove a proposition or theorem you are allowed to make use of everything in the book up to but NOT including the specific item you are asked to prove.

Written assignment 1: Use anything before Proposition 3.37 to prove it:

Let $R = (R, \oplus, \odot, P)$ be an ordered integral domain and $a, b, c \in R$ such that $a \ < \ b$ and $b \ < \ c$. Then $a < c$.

Written assignment 2: Use anything before Proposition 3.56 to prove the following part of it:

Let $(R, \oplus, \odot, P)$ be an ordered integral domain. Let $A \subseteq R$. If A has a maximum then it also has a supremum, and $\max(A) = \sup(A)$.

Written assignment 3: Use the rules of working with quantifiers to negate the following statement (see B/G ch.3.3). No need at all to understand the meaning of this statement. [1]

$\forall\, \varepsilon > 0 \; \exists\, \delta > 0$ such that $\forall\, x \in N_\delta(a)$ it is true that $f(x) \in N_\varepsilon(f(a))$.

[1] You will learn later in this course that this is the definition of continuity of a function $x \mapsto f(x)$ at a point a kn the domain of f.