Math 330 Section 5 - Fall 2022 - Homework 04

Published: Wednesday, September 7, 2022 *Running total:* 19 *points*
Last submission: Monday, September 19, 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 – 2.4, ch.3; skim ch.4; ch.5 – 5.2.3

B/G (Beck/Geoghegan) Textbook:
ch.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, September 12:

- Read carefully MF ch.5.2.4 – 5.2.7.

Reading assignment 2 - due Wednesday, September 14:

a. Read carefully MF ch.5.2.8. You have already encountered much of the material in MF ch.2.4.
b. Read carefully MF ch.2.7. Work with pencil and paper through Proposition 2.7 and be sure to understand Remark 2.19. Read ch.2.8.

Reading assignment 3 - due Friday, September 16:

a. Read carefully MF ch.6.1.
b. Reread the end of MF ch.3.1 about group homomorphisms, starting at Example 3.7.
c. 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: Let $(R, \oplus, \odot, P)$ be an ordered integral domain.

Prove the following part of Proposition 3.49**(a)**: Let $x, y \in R$ such that $0 \leqq x \leqq y$. Then $x^2 \leqq y^2$.

Hint: Some part of Proposition 3.47 might come in handy.

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

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]

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

[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.