

Math 330 Section 5 - Spring 2022 - Homework 03

Published: Friday, January 28, 2022
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Ru03ing total: 16 points

Status - Reading Assignments:

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

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MF lecture notes:

ch.2.1 - 2.3, ch.3.1 - 3.4 until absolute value

B/G (Beck/Geoghegan) Textbook:

ch.1, ch.2.1 - 2.2

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 7:

- a. Read the preface and the notes for both student and instructor in the B/G (Beck Geoghegan) text.
- b. Read very carefully B/G ch.3 on logic. It is extremely short and covers about all I'll teach you on the subject with the exception of truth tables (which you already have encountered when we proved that $A\Delta B$ is associative).
- c. Skim MF ch.4.1 - 4.4, just so you have an idea what's in there. Note that I have marked all of ch.4 as optional, but you will be tested on B/G ch.3!

Reading assignment 2 - due Wednesday, February 9:

- a. Carefully read the remainder of MF ch.3
- b. Skim MF Ch.4.5 but look a little bit more closely at Ch. 4.5.4 (Quantifiers and Negation).

Reading assignment 3 - due Friday, February 11:

- a. Skim the remainder of MF ch.4.
- b. Carefully read MF ch.5 through ch.5.2.3. You already encountered some of the material on functions in ch.2.3.

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) be an integral domain. Use anything up-to and including MF prop. 3.27 to prove MF prop.3.28:
Let $x \in R$. If $x \odot x = x$ then $x = 0$ or $x = 1$.

Written assignment 2:

Let (R, \oplus, \odot, P) be an ordered integral domain. Use anything up-to and including MF prop. 3.34 to prove MF prop.3.35: The multiplicative unit 1 of R belongs to P .

Hint: This is an **indirect proof!** Part of it: Show that you cannot have $\ominus 1 \in P$. **Why** will this help you?

You are **strongly advised** to study the proof of Proposition 3.33 (newly added to MF version 2021-09-01) very thoroughly before working on this problem.