

Math 330 Section 6 - Fall 2020 - Homework 03

Published: Thursday, September 3, 2020
Last submission: Friday, September 18, 2020

Running total: 17 points

Status - Reading Assignments:

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

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

MF lecture notes:
ch.2.1 - 2.3, ch.3.1 - 3.4

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 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 $A \triangle B$ 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, September 9:

- a. Carefully read MF ch.3.5
- b. Skim the remainder of MF ch.4.

Reading assignment 3 - due Friday, September 11:

- a. Carefully read MF ch.5.1 (Cartesian Products and Relations). It is rather abstract.
- b. Carefully read MF ch.5.2.1 (Some Preliminary Observations about Functions). and MF ch.5.2.2. (Definition of a Function and Some Basic Properties). Read at least the easier examples given for functions in MF ch.5.2.3 (Examples of Functions)

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.

In the written assignments below R denotes an ordered integral domain (R, \oplus, \odot, P) .

Written assignment 1:

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?

Written assignment 2:

Use anything up-to and including MF prop. 3.39 to prove MF prop.3.40: If $a, b \in R$ and $a \leq b \leq a$ then $a = b$.

Written assignment 3:

Use anything up-to and including MF prop. 3.49 to prove MF prop.3.50: If $a \in R$ then $|a|^2 = a^2$.

GOOD NEWS: When you do assignments from MF ch.3.4 and later chapters or B/G ch.2 and later chapters, you do not need to justify the rules of arithmetic given to you in MF ch.3.3 and B/G ch.1. No more worry about commutativity of " \oplus " and " \odot " and the need for parentheses to group more than two terms. You may even use the "general laws of associativity": Given any finite sum of element of an integral domain such as $(a_1 \oplus a_2) \oplus (b_1 \oplus b_2)$ you may regroup the parentheses and even drop them. The same is true for products.