# Math 330 Section 4 - Fall 2021 - Homework 03

*Published: Thursday, September 2, 2021* *Running total:* 16 *points*
*Last submission: Friday, September 17, 2021*

**Status - Reading Assignments:**

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

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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: Wednesday, September 8:**

- **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 Friday, September 10:**

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

**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.