

Math 330 Section 6 - Fall 2020 - Homework 09

Published: Thursday, October 8, 2020

Running total: 34 points

Last submission: Friday, October 23, 2020

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 - 7.1 (skip the remainder of ch.7), ch.8, ch.10

MF lecture notes:

ch.2 - 3, ch.5 - 9.7

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)

Other:

Stewart Calculus 7ed - ch.1.7: "The Precise Definition of a Limit". If you have a newer or older edition then you may have to search through the table of contents and/or consult the index.

New reading assignments:

Reading assignment 1 - due Monday, October 12:

- a. Carefully read the mandatory part of MF ch.9.8. and skim the optional material at the end of the chapter. Draw plenty of pictures!
- b. The better students are encouraged to work through the optional chapter 9.9 It puts very high demand on your ability to work with abstract concepts, and you may enjoy it. If you encounter measure theory (I believe that for an undergraduate this will only happen in real analysis II) then this material is usually handled in the first lecture or two on that subject.
- c. Read B/G ch.9. You have encountered the material previously (B/G ch.9.2 was done in MF ch.6. in the context of ordered integral domains).

At this point you are done reading the non-optional material of the first nine chapters of the MF doc, and you have encountered a lot of this material, often in a less abstract form, in the B/G text. Spend some time to cross-reference both documents!

Reading assignment 2 - due: Wednesday, October 14:

- a. Carefully read MF ch.10. It is not important that you understand lemma 10.1 or the proof of the but everything else, including example 10.1, is important to remember.

Reading assignment 3 - due Friday, October 16:

- a. Carefully read B/G ch.13 and cross-reference its material with that of MF ch.7 and ch.10.

Looking ahead to next week: MF ch.11.1 and ch.11.2.1 will review some concepts about vectors and vector spaces which are known to those who have taken or are currently taking a linear algebra course. The content of MF ch.11.1 also is familiar, in dimensions 2 and 3, to those who have taken a multivariable calculus (Calc 3) course.

Written assignments:

Written assignment 1:

Prove lemma 7.1: Let X, Ω be sets such that $X \subseteq \Omega$ and $\omega \in X^c$, and let $\mathfrak{B} := \{A \uplus \{\omega\} : A \in 2^X\}$.

Then the function $F : 2^X \rightarrow \mathfrak{B}; A \mapsto A \uplus \{\omega\}$ is a bijection.

Written assignment 2:

Prove cor.7.3: If X is uncountable and $A \subseteq X$ is countable then A^c is uncountable.