

Math 330 Section 1 - Spring 2016 - Homework 10

Due date: March 14, 2016

Running total: 39 points

Last submission April 4, 2016 (after Spring break)

Note of updates:

- a. The date for the last submission was extended from March 28, 2016 to April 4, 2016.
- b. Assignment 2: " $A \subseteq \mathbb{R} \neq \emptyset$ " was changed to "Let $A \subseteq \mathbb{R}$ such that $A \neq \emptyset$ ".

Status - Reading Assignments:

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

B/G (Beck/Geoghegan) Textbook:

- all of ch.1 - ch.6
- all of ch.7.1; ch.7.2 until before thm.7.15
- all of ch.8 - ch.9
- ch.13.1 and 13.2 **without looking at the proofs**
- ch.13.3 and 13.4 **including proofs**

Other course material:

- "Logic part 1"
- "Sets part 1", "Sets part 2",
- "Functions part 1", "Functions part 2"
- "MF additional material", ch.2 - ch.4
- Stewart Calculus 7ed - ch.1.7: "The Precise Definition of a Limit"

New reading assignments:

Reading assignment 1 - due: Monday, March 14

a. "MF additional material", ch.5 up to and including def.5.12 (Tail sets of a sequence): An easy read but LOTS OF DEFINITIONS to memorize.
We shall continue with ch.5 after having learned about the basics of continuity.

b. "MF additional material", ch.6 until before ch.6.2.2 (normed vector spaces)

Reading assignment 2 - due: Wednesday, March 16

- a. "MF additional material", ch.6.2.2 (normed vector spaces): This chapter was marked as "Skip this" in versions of the document prior to version 2016-03-10
- b. "MF additional material", ch.7 until before ch.7.1.2 (Neighborhoods and open sets)

Reading assignment 3 - due: Thursday, March 17

- a. "MF additional material", ch.7.1.2 and 7.1.3 until before def.7.10: Basis and neighborhood basis.
- b. "MF additional material", ch.7.1.4 and 7.1.5

Reading assignment 4 - due: Friday, March 18

Read carefully B/G ch.10.1-10.3.

Written assignments:

Assignment 1: Let $x, y \in \mathbb{R}$ such that $x < y$. Let $z := (x + y)/2$. Prove that $x < z < y$. **Hint:** Prove first that $2x < x + y < 2y$. Then use prop.8.37(iv) to show that $x < z < y$.

Assignment 2:

Prove part of B/G prop.8.49: Let $A \subseteq \mathbb{R}$ such that $A \neq \emptyset$. If $\sup(A)$ exists and if $\sup(A) \in A$ then $\max(A)$ exists and $\max(A) = \sup(A)$.

Assignment 3:

Prove B/G Prop.9.7(ii): The composition of two surjective functions is surjective.