Math 330 Section 6 - Fall 2020 - Homework 10

Published: Thursday, October 15, 2020 *Running total:* 36 *points*
Last submission: Friday, November 30, 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 - 10, ch.13

MF lecture notes:
ch.2 - 3, ch.5 - 10

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 19:

- **a.** Read MF ch.11.1. It is an easy read even if you do not have any knowledge of vector spaces.
- **b.** If you have not taken or are not currently taking a linear algebra course: Review the suggested material posted on the Course Materials web page. It is very little.
- **c.** Read MF ch.11.2.1 through rem.11.4. Try to understand at least some of the examples given there.

Reading assignment 2 - due: Wednesday, October 21:

- **a.** Read the remainder of MF ch.11.2.1.
- **b.** Carefully read MF ch.11.2.2 through note 11.2. Remember that ch.11.1.3 contains some background about the Euclidean norm.

Reading assignment 3 - due Friday, October 23:

- **a.** Carefully read the remainder of MF ch.11.2.2.
- **b.** Optional: Skim the optional chapter 11.2.3.

Written assignments are on the next page.

Written assignment 1:
Prove the following part of thm.8.1 (De Morgan's Law) If $(A_\alpha)_{\alpha\in I}$ is a family of sets $A_{\alpha\in\Omega}$ then

$$\Big(\bigcap_\alpha A_\alpha\Big)^{\complement} \subseteq \bigcup_\alpha A_\alpha^{\complement}$$

Written assignment 2:
Prove formula (9.14) of prop.9.10: Let X be a nonempty set and $\varphi, \psi : X \to \mathbb{R}$. Let $A \subseteq X$. Then

$$\inf\{\varphi(x) + \psi(x) : x \in A\} \ \geqq\ \inf\{\varphi(y) : y \in A\} \ +\ \inf\{\psi(z) : z \in A\}.$$

Do this proof without applying formula (9.13) to $-\varphi$ and ψ.

Big hint: Examine the proof of formula (9.13) and follow it as closely as possible!