Math 330 Section 6 - Fall 2019 - Homework 12

Published: Thursday, October 24, 2019　　　　　*Running total: 43 points*
Last submission: Friday, November 8, 2019

Status - Reading Assignments: You were asked to complete the following reading so far:

B/G (Beck/Geoghegan) Textbook:
　　ch.1 – ch.8 (ch.7 only until thm.7.17)

MF lecture notes:
　　ch.2, ch.3, ch.5 – ch.9, ch.10.1 up to and including prop.10.1.

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)

Stewart Calculus 7ed - ch.1.7: "The Precise Definition of a Limit".

New reading assignments:

Reading assignment 1 - due Monday, October 28:

　a. Carefully continue reading MF.ch.10 up to and including thm.10.2. (Cantor–Schröder–Bernstein's Theorem)

Reading assignment 2 - due: Wednesday, October 30:

　a. Read carefully the remainder of MF ch.10.
　b. Skim the contents of MF ch.11 through rem.11.4.

Reading assignment 3 - due Friday, November 1:

　a. Skim the remainder of MF ch.11.2.1

Written assignment 1: Prove (9.14) of MF prop.9.10: Let X be a nonempty set and $\varphi, \psi : X \to \mathbb{R}$. Let $A \subseteq X$. Then $\inf\{\varphi(x) + \psi(x) : x \in A\} \geqq \inf\{\varphi(y) : y \in A\} + \inf\{\psi(z) : z \in A\}$.

Specific instructions for assignment 2 of this Math 330 homework: Do not follow the MF doc footnote in this proposition (applying $\inf\{\varphi(u) : u \in A\} = -\sup\{-\varphi(v) : v \in A\}$ to (9.13) but do the proof "from scratch", using the proof given for (9.13) as a template.

Written assignment 2: Prove MF prop.9.17.**b**: If y_n is a sequence of real numbers that is nonincreasing, i.e., $y_n \geqq y_{n+1}$ for all n, and bounded below, then $\lim_{n\to\infty} y_n$ exists and coincides with $\inf\{y_n : n \in \mathbb{N}\}$.

Do the proof by modifying the proof of prop.9.17.**a**. You are **NOT ALLOWED** to apply prop.9.17.**a** to the sequence $x_n := -y_n$!