Math 330 Section 6 - Spring 2024 - Homework 10

Published: Monday, March 11, 2024 Last submission: Friday, March 29, 2024

Running total: 38 points

Status - Reading Assignments:

The reading assignments you were asked to complete before the first one of this HW are:

MF lecture notes:

ch.2.1 – 2.7, ch.3, skim ch.4 (optional), ch.5 - 9.9, ch.11 (linear algebra) through Example 11.11

B/G (Beck/Geoghegan) Textbook: ch.2 - 6.3

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:

You have previously encountered this week's reading assignments in the MF lecure notes.

Reading assignment 1 - due Monday, March 18, 2024 4:

- **a.** Carefully read B/G ch.6.4 and ch.7.1.
- **b.** Review B/G ch.8 and ch.9.
- **c.** Carefully read B/G ch.10.1 10.3.

Reading assignment 2 - due: Wednesday, March 20, 2024 6:

- **a.** Carefully read the remainder of B/G ch.10.
- **b.** Review B/G ch.11.1 and carefully read B/G ch.11.2.

Reading assignment 3 - due Friday, March 22, 2024 8:

a. Carefully read B/G ch.12.

Written assignment are on the next page.

Written assignment 1: Prove formula (9.14) of prop.9.11: Let *X* be a nonempty set and $\varphi, \psi : X \to \mathbb{R}$. Let $\emptyset \neq A \subseteq X$. Then

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

Do the proof by modifying the proof of formula (9.13). Follow that proof as closely as possible! You are **NOT ALLOWED** to apply formula (9.13) to $-\varphi$ and $-\psi$.

Written assignment 2: Prove MF prop.9.18(b): If y_n is a sequence of real numbers that is non-increasing, i.e., $y_n \ge y_{n+1}$ 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.9.18(a). You are **NOT ALLOWED** to apply prop.9.18(a) to the sequence $x_n := -y_n!$