Math 330 Section 2 - Spring 2017 - Homework 12

Published: Saturday, March 18, 2017 *Running total:* 46 *points*
Last submission: ***Extended to Monday, April 3, 2017***

Updated on Monday, 2017-03-27 with ***new hints for #1!***

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.12 (ch.7 carefully until before thm.7.17, ch.11 until cor.11.23)

MF lecture notes:
- ch.1 - ch.2, ch.4 - ch.6
- all of ch.8.1
- ch.16 (addenda to B/G text)

Other material:
- B/K lecture notes ch.1 – section 1, ch.4.1, ch.4.2
  (optional reading – good for examples, improved understanding)
- Stewart Calculus: "The Precise Definition of a Limit" (ch.1.7 in the 7th edition).

New reading assignments:

Due to the loss of two lectures because of the snow storm most of the reading for this week is repetition of previous assignments.

Reading assignment 1 - due Monday, March 20:
a. Reread B/G ch.10. I will skip in lecture most of ch.10.1 and 10.2.

Be sure to learn by heart the definition of convergence of a sequence of real numbers and the important laws and formulas on that subject.

Reading assignment 2 - due Tuesday, March 21:
a. Reread MF ch.8 until before def.8.10 (Tail sets of a sequence).

Again, be sure to learn by heart the definition of convergence of a sequence of real numbers and the important laws and formulas on that subject.

Reading assignment 3 - due Wednesday, March 22:
a. Important for those who did not/are not currently taken a linear algebra class: Read carefully MF ch.9.1 ($\mathbb{R}^N$: Euclidean Space) and ch.9.2.1 (Vector spaces: Definition and Examples).

Reading assignment 4 - due: Friday, March 24:
a. Read carefully MF ch. 8.2 and the addenda to ch.8 (ver 2017-03-28).

Written assignment 1:
Prove B/G prop.10.10(iv): $x, y \in \mathbb{R} \Rightarrow |x-y| \geq \big||x|-|y|\big|$.

Hints:
a. Use the triangle inequality on $|x| = |(x-y)+y|$ and then again on $|y| = |(y-x)+x|$. See what you get for $|x|-|y|$ and for $|x-y|$.
b. Examine separately the cases $|x| \geqq |y|$ and $|x| < |y|$. It's easy now!

Written assignment 2:
Prove B/G prop.10.21(ii):

Let $\lim_{k\to\infty} x_k = L$. If $(x_k)_{k=0}^{\infty}$ is decreasing then $x_k \geq L$ for all $k \geq 0$.

Hint:
- Inspect carefully the proof of B/G prop.10.19: increasing bounded sequence converges. It gives you the argument for increasing sequences.

Written assignment 3:
Prove MF prop.**8.6.a**: Let $\alpha \in \mathbb{R}$ and $x_n = \alpha$ for all $n \in \mathbb{N}$. Then $\lim_{k\to\infty} x_k = \alpha$.
Prove this using the formal ε–N definition of the limit of a sequence (B/G def. at the beginning of ch.10.4 or MF def.8.9)