Math 330 Section 2 - Spring 2017 - Homework 17

Published: Friday, April 14, 2017 *Running total:* 58 *points*
Last submission: Friday, May 5, 2017

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.13 (ch.7 carefully until before thm.7.17, ch.11 until cor.11.23)
- B/G Appendix A: Continuity and Uniform Continuity (ch.7 carefully until before thm.7.17, ch.11 until cor.11.23)

MF lecture notes:
- ch.1 - ch.2, ch.4 - ch.9 (skip the proof of prop.7.3)
- MF ch.10 through ch.10.3, example 10.13 (Alternating series)
- 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:

Reading assignment 1 - due Monday, April 24:

- **a.** Read carefully the remainder of MF ch.10 but skip the proof of thm.10.17 (Riemann's Rearrangement Theorem). This leaves very little except for the addenda to ch.10. Be sure that you are up-to-date there.
- **b.** Prepare for exam 2 which is given on this day. Normed spaces and metric spaces will be especially important. Be sure to understand the concept of a metric subspace.

Reading assignment 2 - due Tuesday, April 25:

- **a.** Read extra carefully MF ch.11.1 and 11.2. Draw pictures for the cases n=1 and n=2.

Reading assignment 3 - due Wednesday, April 26:

- **a.** Continue to carefully read MF ch.11 through thm.11.4 (Sequence compact iff totally bounded and complete).

Reading assignment 4 - due Wednesday, April 28:

- **a.** Continue to carefully read MF ch.11 through thm.11.6 (Compact metric spaces are sequence compact).

Written assignment 1:
Prove thm.10.1 (Norms define metric spaces) on p.171:

Let $(V, \|\cdot\|)$ be a normed vector space. Then the function

$$d_{\|\cdot\|}(\cdot,\cdot) : V \times V \to \mathbb{R}_{\geqq 0}; \qquad (x, y) \mapsto d_{\|\cdot\|}(x, y) := \|y - x\|$$

defines a metric space $(V, d_{\|\cdot\|})$. (This is exercise 10.2 in MF ver 2017-04-17.)

Written assignment 2:
Prove thm.10.25 on p.223 of MF ver 2017-04-17:
Let $(X, \mathfrak{U})$ be a topological space and $A \subseteq X$. Then $\partial A = \bar{A} \cap \overline{A^{\complement}}$. (This is exercise 10.9 in MF ver 2017-04-17.)