Math 330 Section 2 - Fall 2018 - Homework 18

Published: Thursday, November 29, 2018 *Running total:* 63 *points*
Last submission: Friday, December 7, 2018

Note:

There is only one written assignment, but it is worth 5 points. It will be graded ONLY ONCE, and partial credit will be given. It is due at the last day of classes, same as hwk 17!

Status - Reading Assignments:

Here is the status of the reading assignments you were asked to complete by this date.

B/G (Beck/Geoghegan) Textbook:
Preface, ch.1 – ch.6, ch.7.1 (only prop.7.9 – prop.7.12), ch.8 – ch.10,
ch.11 until before cor.11.23, ch.12 – ch.13., Appendix A

MF lecture notes:
ch.1 – ch.3, ch.5 – ch.14
(skip ch.6.3, ch.8.3 and ch.12.2.3).
ch.19.7.2 (The Addition Algorithm for Two Nonnegative Numbers (Base 10))
Any "Addenda" subchapters: those will be added to without notice.

B/K lecture notes (optional):
ch.1.1 (Introduction to sets)
ch.1.2 (Introduction to Functions) but skip ch.1.2.4: Floor and Ceiling Functions

Other:
- Stewart Calculus 8ed - 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.
- Paul Dawkins' linear algebra lecture notes: As indicated at the bottom of the course materials page

New reading assignments:

Reading assignment 1 - due Monday, December 3:

- Review the material on partial orderings in ch.5.1.
- Read carefully ch.15.1 and 15.2

Reading assignment 2 - due: Wednesday, December 5:

- Review ch.11.2.1 (Cardinality as a Partial Ordering).
- Read carefully ch.15.3.

No reading assignment for Friday, December 7.

Written assignment – 5 points! Do all three parts of exercise 14.1 on p.347: Let $N \in \mathbb{N}$. Let $X := \{x_1, x_2, \dots, x_N\}$ be a finite set with a metric $d(\cdot, \cdot)$ (so (X, d) is a metric space). Prove that X is compact three different ways:

- **a.** Show sequence compactness to prove that X is compact.
- **b.** Show that X has the "extract finite open subcovering" property to prove that it is compact.
- **c.** Show that X is complete and totally bounded to prove that it is compact. $\square$

Hints:

- **a.** ANY sequence in X possesses a constant subsequence (WHY?)
- **b.** If $(U_i)_i$ covers X then for each x there exists (at least one) i such that $x \in U_i$ (WHY?) How many of those U_i do you need to cover X if X has only N elements?
- **c.** Prop.13.31 on p.302 should prove useful.