Math 330 Section 7 - Spring 2019 - Homework 13

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Last submission: Friday, April 12, 2019

Update April 7, 2019

Last submission date was corrected to Friday, April 12.

Status - Reading Assignments:

Here is the status of the reading assignments you were asked to complete so far:

B/G (Beck/Geoghegan) Textbook:
Preface and ch.1 – ch.6, ch.7.1, ch.8 – ch.12

MF lecture notes:
ch.1 – ch.3; ch.5 – ch.7 (skim ch.6.3); ch.8.1 – 8.2; ch.9.1 through prop.9.7; ch.9.2; ch.10.1 – ch.10.6; ch.19.7(!)

B/K lecture notes:
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 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:

Reading assignment 1 - due Monday, March 25:

a. Read carefully MF ch.10.7. Review the material on indicator functions beforehand!
a. Read carefully MF ch.10.8. To fully appreciate what it says, accept without proof (for now) that $\mathbb{R}$ is uncountable!

Reading assignment 2 - due: Wednesday, March 27:

- Read carefully MF ch.11. Skip the proof of thm.11.4 (the Cantor–Schröder–Bernstein Theorem).

Reading assignment 3 - due Friday, March 29:

a. Read B/G ch.13 on cardinality as follows:
- Skim through ch.13.1 – 13.5. You have seen everything important already in MF ch.7 and MF ch.11.
- Read carefully ch.13.6 on nondescribable numbers, especially if you plan to major in computer science.

Looking ahead:

Next week's reading assignment will be about MF ch.12: Vectors and Vector Spaces. If you have not taken or are not currently taking linear algebra then be sure to look at the instructions at the bottom of the course materials page (Additional course material: Linear Algebra)!

Written assignment 1: Prove MF prop.10.20.**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.10.20.**a**. You are **NOT ALLOWED** to apply prop.10.20.**a** to the sequence $x_n := -y_n$!

Written assignment 2: Prove MF thm. 10.8: If $m \in \mathbb{N}$ is not a perfect square then $\sqrt{m}$ is irrational.