Math 330 Section 6 - Spring 2020 - Homework 04

Published: Saturday, February 1, 2020 *Running total:* 21 *points*
Last submission: Friday, February 14, 2020

Update February 7, 2020

Error in reading assignment 1: "Carefully read MF ch.5.4 – 5.6" was meant to read: "Carefully read MF ch.5.2.4 – 5.2.6" This has been corrected.

Status - Reading Assignments:

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

B/G (Beck/Geoghegan) Textbook:
ch.1, ch.2.1 – 2.2, ch.3

MF lecture notes:
ch.2, ch.3, ch.5 through ch.5.2.3

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)

New reading assignments:

Reading assignment 1 - due Monday, February 10:

a. Carefully read MF ch.5.2.4 – 5.2.6. (corrected!) The concepts discussed there will be used throughout during the remainder of the course.

Reading assignment 2 - due: Wednesday, February 12:

a. Carefully read the remainder of MF ch.5.
b. Carefully read B/G ch.5 and ch.6.1

Reading assignment 3 - due Friday, February 14:

a. Carefully read MF ch.6.1.
b. Carefully read the remainder of MF ch.2.
b. Carefully read the remainder of B/G ch.2.

General note on written assignments: Unless expressly stated otherwise, to prove a proposition or theorem you are allowed to make use of everything in the book up to but NOT including the specific item you are asked to prove.

Written assignment 1:
Prove the following part of MF prop.3.56: Let $(R, \oplus, \odot, P)$ be an ordered integral domain and $\emptyset \neq A \subseteq R$. If A has a maximum then it also has a supremum, and $\max(A) = \sup(A)$.

Written assignment 2:
Use the rules of working with quantifiers to negate the following statement (see B/G ch.3.3). No need at all to understand the meaning of this statement.

$\forall \varepsilon > 0 \; \exists \delta > 0$ such that $\forall x \in N_\delta(a)$ it is true that $f(x) \in N_\varepsilon(f(a))$.

Written assignment 3:
One point each for **a** and **b**:

Let $X, Y \neq \emptyset$ and $f : X \to Y$.

a. Prove that $R := \{(x, x') \in X \times X : f(x) = f(x')\}$ is an equivalence relation on X.

b. For the special case $f : \mathbb{R} \to \mathbb{R}; \quad x \to x^2$ compute the equivalence classes $[2], [0], [-2]$ for this equivalence relation.