Math 330 Section 7 - Spring 2019 - Homework 05

Published: Thursday, February 7, 2019 *Running total: 23 points*
Last submission: Friday, February 22, 2019

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.3

MF lecture notes:
ch.1 – ch.3; ch.5 through ch.5.2.7

B/K lecture notes (optional but **very useful for hwk 3**):
ch.1.1 (Introduction to sets)
ch.1.2 (Introduction to Functions) but skip ch.1.2.4: Floor and Ceiling Functions

New reading assignments:

Reading assignment 1 - due Monday, February 11:

- **a.** Read carefully MF ch.5.2.8 (finish ch.5)
- **b.** Read carefully B/G ch.5 (nothing new!)
- **c.** Read carefully MF ch.6.1 and reread B/G ch.2.3 and 2.4

Reading assignment 2 - due: Wednesday, February 13:

- **a.** Read carefully MF ch.6.2 and skim through (the optional) ch.6.3
- **b.** Read carefully MF ch.6.4–6.6

Reading assignment 3 - due Friday, February 15:

- **a.** Read carefully B/G ch.4.

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:
Negate the following statement (see B/G ch.3.3):

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

Written assignment 2:

Let X, Y be two nonempty sets and let $f : X \longrightarrow Y$. For $a, b \in X$ we write $a \sim b$ iff $f(a) = f(b)$.

- **a:** Prove that $\sim$ is an equivalence relation on X.
- **b:** Write $[x]_f$ for the equivalence class of $x \in X$ with respect to "$\sim$". Express $[x]_f$ in terms of the function f: $[x]_f = \{x' \in X : f(x')$.....??.......$\}$. (I do not want to see "$[x]_f = \{x' \in X : x' \sim x\}$".)

You'll get one point each for **a** and **b**.

Written assignment 3:

Let A, B, C, D be sets. Prove that $(A \times B) \cap (C \times D) = (A \cap C) \times (B \cap D)$. as follows:

a. Prove "$\subseteq$"; **b.** Prove $\supseteq$. You'll get one point each for **a** and **b**.