Math 330 Section 5 - Spring 2022 - Homework 06

Published: Thursday, January 14, 2022 *Running total:* 29 *points*
Last submission: Friday, March 4, 2022

Status - Reading Assignments:

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

MF lecture notes:
ch.2.1 - 2.4, ch.3, ch.4 (skim), ch.5 - 6.2

B/G (Beck/Geoghegan) Textbook:
ch.1, ch.2.1 - 2.3, ch.3, ch.5

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 21:

a. Read carefully MF ch.6.3 and ch.6.4.
b. Skip MF ch.6.5 but carefully read MF ch.6.6 – 6.8

Reading assignment 2 - due: Wednesday, February 23:

a. Review B/G ch.2.4 through Prop.2.33 and skip the remainder of B/G ch.2.
b. Review B/G ch.4.1 - 4.5 and skim the remainder of B/G ch.4.

Reading assignment 3 - due Friday, February 25:

a. Carefully read MF ch.6.9–6.11.
b. Review B/G ch.6.1–6.3.

Written assignments are on the next page.

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

One point each for **(a)** and **(b)**!!

Written assignment 2:
Prove formulas (5.15) and (5.16) of Proposition 5.4: Let $f : X \to Y$. Then

(a) (5.15) $\quad A_1 \subseteq A_2 \subseteq X \Rightarrow f(A_1) \subseteq f(A_2)$
(b) (5.16) $\quad B_1 \subseteq B_2 \subseteq Y \Rightarrow f^{-1}(B_1) \subseteq f^{-1}(B_2)$

One point each for **(a)** and **(b)**!!