Math 330 Section 1 - Fall 2016 - Homework 06

Published: Saturday, September 17, 2016 *Running total:* 30 *points*
Last submission: Friday, September 30, 2016

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.3, ch.4.1-4.4, ch.5

MF lecture notes:
ch.1, ch.2, ch.4-ch.6

B/K lecture notes (optional reading – good for examples, improved understanding):
ch.1.1, ch.4.1, ch.4.2

New reading assignments:

Reading assignment 1 - due Monday, September 19:
Read carefully the remainder of B/G ch.4. (ch.4.5 and 4.6) Binomial Thm and Strong Induction)
Read carefully B/G ch.6.1 (Equivalence Relations)

Reading assignment 2 - due: Tuesday, September 20:
Read carefully B/G ch.6.2 (The Division Algorithm)

Reading assignment 3 - due Wednesday, September 21:
Read carefully B/G ch.6.3 (The Integers Modulo n)

Reading assignment 4 - due Friday, September 23:
Read carefully the remainder of B/G ch.6, i.e., ch.6.4 (Prime Numbers)

Written assignment 1:

Given are four sets A, B, C, D. prove that

$$\begin{aligned} &\textbf{a.} \quad (A \times B) \cap (C \times D) \ \subseteq \ (A \cap C) \times (B \cap D), \\ &\textbf{b.} \quad (A \times B) \cap (C \times D) \ \supseteq \ (A \cap C) \times (B \cap D). \end{aligned}$$

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

Written assignment 2:

Prove (5.5) of MF Example 5.1 (p.89): Let $a, b \in \mathbb{R}$. Then

$$\begin{aligned} &\textbf{a.} \quad]a, b[\subseteq \bigcup_{n \in \mathbb{N}} [a + 1/n, b - 1/n], \\ &\textbf{b.} \quad]a, b[\supseteq \bigcup_{n \in \mathbb{N}} [a + 1/n, b - 1/n]. \end{aligned}$$

Note for the above that $[u, v] = \emptyset$ for $u > v$ and $]u, v[= \emptyset$ for $u \geqq v$.

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

Hints for assignment 2 added on 9/27/2016:

1. One direction is completely trivial. Which one?
2. For the other direction: You may use the following property of the real numbers if you refer to it as "(Hwk 7 $\star$)":

   If $u, v \in \mathbb{R}$ and $u < v$ then there exist some (possibly very large) $n \in \mathbb{N}$
   such that $u + 1/n < v$ (and hence also $u < v - 1/n$).

   What values to use for u and v? That's for you to figure out.