Math 330 Section 4 - Fall 2021 - Homework 04

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Last submission: Friday, September 24, 2021

Update September 15, 2021

> *Removed clause **a** from Wednesday's reading: duplicate of Friday's reading.*

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.2.1 - 2.3, ch.3, skim ch.4

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, September 13:

a. Read carefully MF ch.2.4 and review MF ch.2.5 (the remainder of MF ch.2). Here we talk about proofs by induction as a technique. The theory will be covered later in MF ch.6. and B/G ch.2.3.
b. Read carefully MF ch.5.1 up to and including Proposition 5.2. Do not skip the examples and remarks!

Reading assignment 2 - due: Wednesday, September 15:

a. Read carefully MF ch.5.2.1 and ch.5.2.2. Functions are used pervasively and in often very subtle ways during the remainder of this course and you are advised to work through all the remarks and examples given in those chapters unless they relate to concepts of linear algebra and you have not yet taken that course.

Reading assignment 3 - due Friday, September 17:

a. Read carefully MF ch.5.2.3. Pay particular example to Example 5.19 which shows how to visualize a function for which both domain and codomain only contain a few elements.

Written assignments are on the next page.

Written assignment 1:
Use anything up-to and including MF prop. 3.39 to prove MF prop.3.40: If $a, b \in R$ and $a \leqq b \leqq a$ then $a = b$.

Written assignment 2:
Use anything up-to and including MF prop. 3.49 to prove MF prop.3.50: If $a \in R$ then $|a|^2 = a^2$.

Written assignment 3:
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. [1]

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

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[1]You will learn later in this course that this is the definition of continuity of a function $x \mapsto f(x)$ at a point a kn the domain of f.