

Math 330 Section 7 - Fall 2026 - Homework 04

Published: Friday, September 4, 2026

Running total: 18 points

Last submission: Friday, September 25, 2026

Status - Reading Assignments:

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

MF lecture notes:

ch.1 – 3; skim/skip ch.4 on logic

B/G (Beck/Geoghegan) Textbook:

ch.2.1 – 2.2, ch.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)

Reading assignment 1 - due: Monday, September 7: I set the reading assignment date to Mon 9/7 rather than Tue 9/8 because that allows you to pace your reading more evenly.

- a. Carefully read MF ch.5 through ch.5.2.4. (A First Look at Direct Images and Preimages of a Function.) You have already encountered much of the material on functions in ch.2.4.

Reading assignment 2 - due: Wednesday, September 9:

- a. Read carefully the remainder of MF ch.5.2 (sections 5.2.5 - 5.2.8). Particularly important: the connection between injectivity, surjectivity, and right/left inverses. Some of the material has already been encountered in ch.2., but here we go deeper. Note that Cartesian products being sets containing families as their elements requires getting used to!
- b. The stronger students are encouraged to look at ch.5.3. The material is quite accessible. Only the proof of Proposition 5.13 is tough to digest.

Reading assignment 3 - due Friday, September 11:

- a. Read carefully B/G ch.5 on sets and functions and B/G ch.9.1. You already have encountered the material in MF ch.2 and ch.5.1 - 5.2.
- b. Read **extra carefully** MF ch.6.1. We briefly did induction already: We proved the (finite) geometric series formula. Proofs by induction will appear on all major exams!
- c. Read carefully MF ch.6.2 and 6.3. They are very brief.

Written assignments are on the next page.

Written assignments:

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: Use anything before Proposition 3.55 to prove the following part of Proposition 3.55:

Let $(R, \oplus, \odot, P)$ be an ordered integral domain. Let $A \subseteq R$. If A has a minimum then it also has an infimum, and $\min(A) = \inf(A)$. Surprisingly tough! Start early!

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. ¹

$\forall \alpha > 0 \exists \beta > 0$ such that $\forall x \in N_\beta(z)$ it is true that $f(x) \in N_\alpha(f(z))$.

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