Math 330 Section 7 - Fall 2026 - Homework 10

Published: Friday, October 16, 2026 Running total: 37 points
Last submission: Friday, November 6, 2026

Status - Reading Assignments:

The reading assignments you were asked to complete before the first one of this HW are:

MF lecture notes:

ch.1 – 9.5; skim/skip ch.4 on logic

B/G (Beck/Geoghegan) Textbook:

ch.1 – 5, ch.8 – 9

Other material (optional):

B/K lecture notes: ch.1.1 (Introduction to sets) (optional) and ch.1.2 (Introduction to Functions)

Stewart Calculus 7ed - ch.1.7: "The Precise Definition of a Limit"

Reading assignment 1 - due: Monday, October 19:

- **a.** Carefully read B/G ch.6 and ch.7.1. This corresponds to material in MF ch.6.
- **b.** Carefully read B/G ch.10. This corresponds to material in MF ch.9.1 – 9.3.

Reading assignment 2 - due: Wednesday, October 21:

- **a.** Carefully read MF ch.9.6 and 9.7.
- **b.** Carefully read B/G ch.11. This corresponds to material in MF ch.9.4.

Reading assignment 3 - due Friday, October 23:

- **a.** Carefully read MF ch.9.8 until before Proposition 9.44. and skim the optional remainder.
- **c.** Skip the optional MF ch.9.9 (Sequences of Sets and Indicator functions and their liminf and limsup). The stronger students and those who consider getting a master's degree in probability/statistics/actuarial science are encouraged to study the material, in particular the last remark.

Additional reading assignment (optional):

- **a.** If you have not taken or are not currently taking linear algebra, this would be a good time to look at MF ch.11 through Example 11.11. That's nine pages of very easy material.

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: Prove the following part of De Morgan's Law:
Let there be a universal set Ω which contains all elements of an indexed family of sets $(A_\alpha)_{\alpha\in I}$. Then

$$\big(\bigcap_\alpha A_\alpha\big)^{\complement} \subseteq \bigcup_\alpha A_\alpha^{\complement}\,.$$

Written assignment 2: Prove formula (8.33):
If X, Y, Z be arbitrary, nonempty sets and $f : X \to Y$, $g : Y \to Z$, and $U \subseteq X$, then

$$(g \circ f)(U) \;=\; g\big(f(U)\big)$$

Written assignment 3: Prove formula (8.34):
If X, Y, Z be arbitrary, nonempty sets and $f : X \to Y$, $g : Y \to Z$, and $W \subseteq Z$, then

$$(g \circ f)^{-1}(W) \;=\; f^{-1}\big(g^{-1}(W)\big)$$