

Math 447 - Spring 2025 - Homework 03

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Status - Reading Assignments:

Here are the reading assignments to be completed before the first one of this HW.

WMS (Wackerly, et al. Textbook):

Nothing assigned yet

MF447 lecture notes:

ch.1 - 3, ch.4.1

Other:

Nothing assigned yet

New reading assignments:

It is really important for the WMS reading assignments that you work through the examples!

Reading assignment 1 - due Monday, January 27:

- a. Extra carefully read MF ch.2.4. You may find it very difficult if you did not attend Math 330 Remember that I talked in Ch.1 about the assignment $A \mapsto P(A)$ of a probability measure as a function $2^\Omega \rightarrow [0, 1]$.
- b. Carefully read the remainder of MF ch.2. Note that ch.2.5 (Preimages) is new in MF ver 2025-01-23!

Reading assignment 2 - due: Wednesday, January 29:

- a. Carefully read MF ch.3 through Example 3.4 in Ch.3.2.1. You should understand how this material relates to Calc 2 and Calc 3. You (should) have learned the material in Calc2 and Calc3. Only the notation is quite different.

Reading assignment 3 - due Friday, January 31:

- a. Carefully read the remainder of MF ch.3. You should understand how this material relates to Calc 2 and Calc 3.
- b. Carefully read the few non-optional parts of MF ch.4.1. You will strongly benefit if you understand from the examples and remarks the content of the definitions and theorems. Only the strong students are encouraged to look at the proofs.

General note on written assignments: I will not collect those assignments for grading but doing them might be helpful for your quizzes and exams.

Written assignments are on the next page.

(a) Work closed book through the examples given in Section 3.4 (Series and Integrals as Tools to Compute Probabilities).

All integrals in there are given as Riemann integrals.

(b) Write from memory the following definitions and compare them with the MF lecture notes:

- Step functions and simple functions
- Lebesgue integral for $f \geq 0$. For the strong students: Can you draw a picture that shows how such f is approximated from below by simple functions?
- Properties of the Riemann integral.
- Properties of the Lebesgue integral.
- Monotone and dominated convergence theorems. Write them from memory until you get the assumptions and conclusions right for both of them!
- Really important: Work through the examples given in Problem 4.1.
- Write Fubini's theorems from memory for both Riemann integral and Lebesgue integral.

Selected answers:

None, since all answers to (a) can be found in the lecture notes.