# Math 447 - Fall 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 - 3.2

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 Tuesday, September 2:**

- **a.** Carefully read MF ch.3.3 You should understand how this material relates to Calc 2 and Calc 3.
- **b.** **Extra carefully(!)** read the remainder of MF ch.3. (ch.3.4). Study each one of the examples of Chapter 3.4. They are applications of the general and abstract math you have seen before to probability!
- **c.** Carefully read MF ch.4. You will strongly benefit if you understand from the examples and remarks the content of the definitions and theorems. Pay special attention to Remark 4.5, In particular, you should study the picture shown there. Only the strong students are encouraged to look at the proofs.

**Reading assignment 2 - due: Wednesday, September 3:**

- **a.** Carefully read MF ch.5.1 through Remark 5.8. You have seen introductory versions of some of that material in previous chapters.

**Reading assignment 3 - due Friday, September 5:**

- **a.** Carefully read the remainder of MF ch.5.1
- **b.** Carefully read MF ch.5.2 and ch.5.3

**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 rom 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.
- $\sigma$–algebras
- probability measures and probability spaces (ch.5 definition!) • equiprobability • Continuity property of probability measures (optional, but helpful)
- discrete probability spaces • Theorem 5.2 and Cor.5.1
- Read again Remark 5.8. In part **(d')**, understand the cases $n = 2$ and $n = 3$.
- Review the (otional) Fact 5.1. You will not be quizzed on it, but you want to understand it.
- Additive law of probability and the rule of the Complement
- Work Remark 5.12 closed book!
- Conditional probability • Multiplicative Law of Probability • Independence of $2, 3, n$ events and of sequences of events

**Selected answers:**

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