

Math 630, Fall of 2007  
Real Analysis

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**The URL for the WIKI:**

*[http://www.otal.umd.edu/wiki/real\[underscore\]analysis\[underscore\]book](http://www.otal.umd.edu/wiki/real[underscore]analysis[underscore]book)*

**Texts for the Course**

I am currently preparing a fourth edition of Royden's Real Analysis which will become Royden and Fitzpatrick's Real Analysis. I will distribute the first eight chapters of an almost final draft to the class and a nominal charge for printing the draft will be charged. In addition, I have placed on reserve in the Engineering Library a copy of my Advanced Calculus book which contains background material.

**Office Hours**

Office hours will take place after each class, between 10.00 until 11. 00. Office hours can also be arranged by appointment.

**Grades and Exams**

There will be a Midterm Exam and a Final Exam. Each of these will be worth 30 points. The homework will count 40 points. The midterm will take place after we have completed Chapter 4 and will be announced the week preceding the midterm. <sup>1</sup>The Final Exam will take place in our regular classroom, between 8.00 a.m. and 10.00 a.m., on Monday, December 17th.

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<sup>1</sup>Oct 17th at 8.30 a.m. on Chapters 2,3 and 4 and Section 5.1.

## Homework

A homework assignment will be due each Monday and returned on the following Friday. Only a portion, but at least half, of the assigned problems will be graded. The lowest homework grade will be dropped since late homework will not be accepted. On each Friday, beginning on Sept 8, I will discuss the homework problems and other material between 8.00 to 9.00 in the classroom.

## Three Preliminary Background Lectures

I will present three extra lectures, between 8.00 and 9.00, in the classroom, on Friday, August 31, Wednesday, Sept 5 and Friday, Sept 8. These will cover a number of background topics regarding properties of real-numbers that are assumed to be prerequisites. This material, being prerequisite, will subsequently be used freely in the course without further detailed discussion.

## Homework Assignments

**Homework Assignments will be posted at least one week ahead of their due date at**

*[www.math.umd.edu/~pmf/630SyllabusandHomeworkk.pdf](http://www.math.umd.edu/~pmf/630SyllabusandHomeworkk.pdf)*

### Homework due on Wednesday, September 5:

Problems 1, 2, 3, 6 8 and 9 in Chapter 2.

### Homework due Monday, September 10:

Problems 10, 11 and 12 in Chapter 2. Extra Problem: Assume that for each Borel set  $E$  there is defined a number  $\mu(E)$  in  $[0, \infty]$  and this set function  $\mu$  has the following properties: it (i) assigns length to a bounded interval, (ii) is translation invariant and (iii) is countably additive. Must  $\mu(E) = m^*(E)$  for every Borel set  $E$ ?

### Homework due on Monday, September 17:

Problems 14, 15, 17, 28, 30, 36 and 37 in Chapter 2: Extra Problem: Show that the countable additivity of Lebesgue measure over disjoint unions follows from the property that the measure of the intersection of a descending sequence of sets of finite measure is the limit of the measures of the sets in the sequence.

### Homework due on Monday, September 24:

Problems 42, 43 and 44 in Chapter 2. Problems 7, 8, 11, 14 and 23 in Chapter 3.

**Homework due Monday, October 1:**

Problems 10, 25, 29 and 31 in Chapter 3. Problems 4, 5 and 6 in Chapter 4.

**Homework due Monday, October 8:**

Problems 8, 9, 13, 15, 16, 20 and 21 in Chapter 4

**Homework due Monday, October 15:**

Problems 23, 24, 25, 26 and 34 in Chapter 4. Problems 2 and 4 in Chapter 5.

**Homework due Monday, October 29:**

Problems Problems 13, 14 and 19 in Chapter 5. Problems Problems 2, 4, and 5 in Chapter 6.

**Homework due Monday, November 5:**

Problems 6, 15, 16, 21, 22, 23 and 26 in Chapter 6.

**Homework due Monday, November 12:**

Problems 28, 29, 30, 36 and 40 in Chapter 6.

**Homework due Monday, November 19:**

Problems 6, 8, 11, 19 and 20 in Chapter 7

**Homework due Monday, November 26:**

Part I: Problems 18, 27, 28, 29 in Chapter 7. Part II: enter two corrections in the WIKI for each of the chapters and identify yourself with the suggestions.

**Homework due Monday, December 3:**

Problems 1, 2, 4, 5, 6, 7 and 10 in Chapter 8: Extra Problem: Use the restriction method to obtain the Riesz Representation Theorem for the dual of  $L^p(E)$ , where  $E$  is bounded and measurable from the case  $E = [a, b]$ .

**Homework due Monday, December 10:**

Problems 12, 13, 14, 16, 12, 17 and 19 in Chapter 8