

Math Camp Part II
 Summer 2009
 Instructor: Matthew Hoelle

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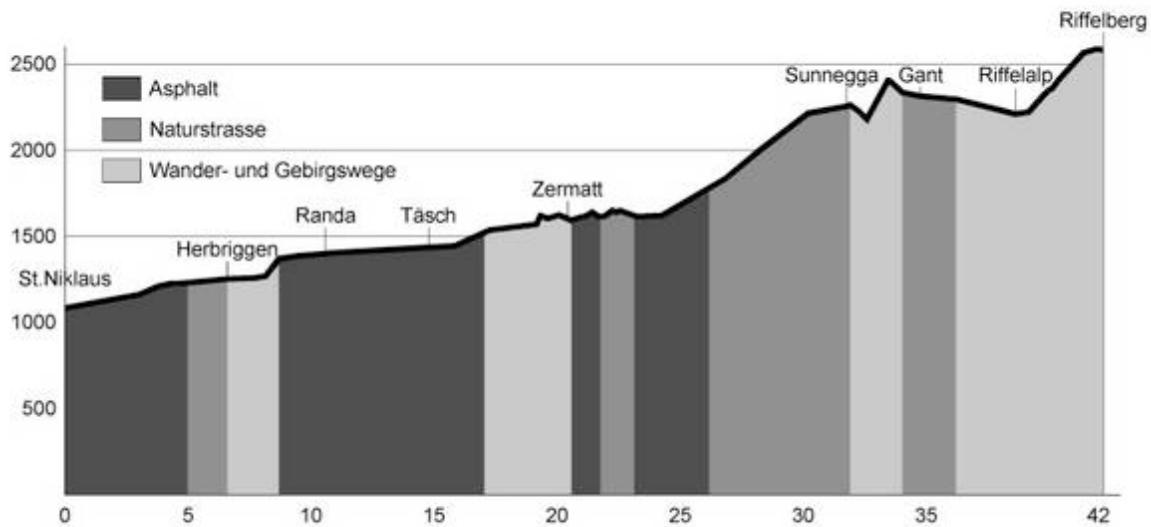
Office: McNeil 550

Office Hours: Monday- Thursday 3:45 –4:45 in my office

Note: Office hours for Thursday, August 13th are canceled.

Syllabus

The hike ahead for the next two weeks....



Monday 1: (morning) difficulty: easy
 Course introduction, review of key concepts from Analysis in \mathbb{R}^1
 Sources: (afternoon) difficulty: medium
 Rudin Meticulous proof of the Inverse Function Theorem in \mathbb{R}^1 (this will be
 Part I notes our guide when proving the most difficult result in part II, Inverse
 Function Theorem in \mathbb{R}^n)

Tuesday 1: Analysis in \mathbb{R}^n difficulty: medium
 (morning)
 Sources: Definitions, Heine-Borel Theorem, Weierstrass Theorem, continuity,
 Rudin Extreme Value Theorem
 Part I notes (afternoon) difficulty: difficult
 Connected, path-connected, Intermediate Value Theorem

Wednesday 1:	Linear Algebra Half 1 (morning) Theory	difficulty: medium
Sources:	(afternoon) Applications	difficulty: easy
Rudin	Vector spaces, matrices as linear mappings, rank, inversion, elementary operations	
Strang		
Thursday 1:	Linear Algebra Half 2 (morning) Theory	difficulty: medium
Sources:	(afternoon) Applications	difficulty: easy
Rudin	Determinant: definition and properties	
Strang		
Friday 1:	(morning) Quiz 1 (closed notes, closed books)	difficulty: medium?
Sources:	(afternoon)	difficulty: medium
Gale	Introduction of Farkas' lemma, duality	
Monday 2:	(morning) Review Quiz 1 solutions (graded test books returned)	
Sources:	(afternoon)	difficulty: difficult
Rudin	Differentiation in \mathbb{R}^n	
Part I notes	Chain rule, partial derivatives, Mean Value Inequality	
Tuesday 2:	(morning)	difficulty: very difficult
Sources:	Statement and proof of the Inverse Function Theorem in \mathbb{R}^n	
Rudin	(afternoon)	difficulty: very difficult
Spivak	Applications including Stack of Records Theorem and Rank Theorem	
Lee	(generalized version of Rank-Nullity Law)	
Milnor		
Wednesday 2:	(morning)	difficulty: difficult
Sources:	Statement and proof of Implicit Function Theorem in \mathbb{R}^n ; examples	
Rudin	(afternoon)	difficulty: medium
	Applications including no arbitrage asset pricing and Slutsky decomposition	
Thursday 2:	(morning)	difficulty: medium
Sources:	Introduction of Riemann integration	
Rudin	(afternoon)	difficulty: difficult
	Change of Variables theorem (application of integration result and Inverse Function Theorem)	
Friday 2:	(morning) Quiz 2 (closed notes, closed books)	difficulty: medium?
	(afternoon)	
	Review Quiz 2 solutions (graded test books NOT returned at this time)	

Grading

1. The overall Math Camp course grade will be based on the average of the LETTER GRADE in each of the three parts (Kurt, Matt, Fatih).
2. For my part (Part II), the math camp grade will either be:
 - Total score on Part II of the waiver exam on Wed., September 2 OR
 - $1/2$ (Total score on Part II of waiver) + $1/4$ (Quiz 1 + Quiz 2)

Additionally, there will be weekly problem sets. These will not count toward the final grade, but are good practice for the quizzes. Solutions for these problem sets will be made available on Thursday, the afternoon prior to the quizzes.

References

Rudin, Walter. Principles of Mathematical Analysis, Third Edition. McGraw-Hill, Inc. (1976).

Strang, Gilbert. Linear Algebra and its Applications. Brooks Cole (2005).

Mukhopadhyay, Sankar. Mathematics for Economists: Part I (Math Camp Part I). *mimeo*, University of Pennsylvania (2003).

Spivak, Michael. Calculus on Manifolds (1965).

Gale, David. The Theory of Linear Economics Models (1960).

Milnor, John. Topology from Differentiable Viewpoints. Princeton University Press (1965).

Lee, John M. Introduction to Smooth Manifolds. Springer (2006).