

## Real Analysis Exam Solutions

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### Real Analysis Exam Solutions

MATH 4310 Intro to Real Analysis Practice Final Exam Solutions 1. Find the limits of the following sequences. (a)  $s_n = nx^{1+n}$ ;  $x > 0$  Solution:  $s_n \rightarrow 0$  since  $|nx^{1+n}| < 1$  for  $n > 1/x$ . (b)  $s_n = n(1 - \cos(x/n))$ ;  $x > 0$  Solution: By Taylor remainder thm (Theorem 2.5.4),  $\cos(x/n) = 1 - \frac{1}{2}(x/n)^2 + \sin(c/n)(x/n)^3$ , for some  $c \in (0, x/n)$ . Thus,  $s_n \rightarrow \frac{1}{2}x^2$ .

### MATH 4310 Intro to Real Analysis

Math 312, Intro. to Real Analysis: Final Exam: Solutions Stephen G. Simpson Friday, May 8, 2009 1. True or false (3 points each). (a) For all sequences of real numbers  $(s_n)$  we have  $\liminf s_n \leq \limsup s_n$ . True.

### Math 312, Intro. to Real Analysis: Final Exam: Solutions

XExclude words from your search. Put - in front of a word you want to leave out. For example, jaguar speed -car. Search for an exact match. Put a word or phrase inside quotes. For example, "tallest building". Search for wildcards or unknown words. Put a \* in your word or phrase where you want to leave a placeholder.

### Exams | Real Analysis | Mathematics | MIT OpenCourseWare

Math 312, Intro. to Real Analysis: Midterm Exam #1 Solutions Stephen G. Simpson Friday, February 13, 2009 1. True or False (3 points each) (a) Every ordered field has the Archimedean property.

### Math 312, Intro. to Real Analysis: Midterm Exam #1 Solutions

Solution: This is known as Bernoulli's inequality. Let  $a \in \mathbb{R}$  with  $a > -1$ . We proceed by induction. For  $n = 0$ ,  $(1 + a)^0 = 1 = 1 + (0)a$  which is trivially true. Assume that the inequality is true for some  $k \geq 0$ . Then  $(1 + a)^k \geq 1 + ka$ . Consider the case of  $k+1$ . Since  $a > -1$ , then  $1+a > 0$ . By assumption,  $(1+a)^k \geq 1+ka$ . Hence,  $(1+a)^{k+1} = (1+a)(1+a)^k \geq (1+a)(1+ka)$ .

### Math 4317 : Real Analysis I Mid-Term Exam 1 25 September 2012

4. (a) Suppose  $f_n: A \rightarrow \mathbb{R}$  is uniformly continuous on  $A$  for every  $n \in \mathbb{N}$  and  $f_n \rightarrow f$  uniformly on  $A$ . Prove that  $f$  is uniformly continuous on  $A$ . (b) Does the result in (a) remain true if  $f_n \rightarrow f$  pointwise instead of uniformly? Solution. • (a) Let  $\epsilon > 0$ . Since  $f_n \rightarrow f$  converges uniformly on  $A$  there exists  $N \in \mathbb{N}$  such that  $|f_n(x) - f(x)| < \epsilon/3$  for all  $x \in A$  and  $n > N$ .

### RealAnalysis Math 125A, Fall 2012 Sample Final Questions

FINAL EXAMINATION SOLUTIONS, MAS311 REAL ANALYSIS I 3 (ii) Show that  $s_n \leq 2$  for all  $n$ . (Hint: Use induction again.) (5 marks) Proof. Once again, the case for  $n = 1$  is easily true as  $s_1 = \sqrt{2} \leq 2$ . Assuming the contention hold for  $n = k - 1$ , then  $s_k = \sqrt{2 + s_{k-1}} \leq \sqrt{2 + 2} = 2$ , where the inequality above follows from the induction hypothesis.

### FINAL EXAMINATION SOLUTIONS, MAS311 REAL ANALYSIS I ...

Solution: (a): Since  $x^{2n}$  tends to  $+\infty$  when  $|x| > 1$  and converges to 0 when  $|x| < 1$  we obtain the

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pointwise limit  $F(x) = 0$  if  $|x| > 1$ ,  $F(x) = 1$  if  $|x| = 1$ ,  $F(x) = 1$  if  $|x| < 1$  (b): Any compact subset  $A$  of  $(-1,1)$  is contained in a closed interval  $[-a,a]$ , for some  $a \in [0,1)$ .

## Ph.D. QUALIFYING EXAM IN REAL ANALYSIS

Math 4317 : Real Analysis I Mid-Term Exam 2 1 November 2012 Name: Instructions: Answer all of the problems. Definitions (1 point each) 1. For a sequence of real numbers  $f_n$ , state the definition of  $\limsup f_n$  and  $\liminf f_n$ . Solution: Let  $u_N = \sup\{f_n : n > N\}$  and  $l_N = \inf\{f_n : n > N\}$ . Then  $\limsup f_n = \lim_{N \rightarrow \infty} u_N$  and  $\liminf f_n = \lim_{N \rightarrow \infty} l_N$ .

## Math 4317 : Real Analysis I Mid-Term Exam 2 1 November 2012

UCLA Analysis Qualifying Exam Solutions Last updated: July 27, 2020 List of people that have contributed solutions: Adam Lott William Swartworth Matthew Stone Ryan Wallace Bjoern Bringmann Aaron George James Leng Compiled and maintained by Adam Lott Contents 1 Spring 2009 3 2 Fall 2009 8 3 Spring 2010 13 4 Fall 2010 17 5 Spring 2011 23 6 Fall ...

## UCLA Analysis Qualifying Exam Solutions

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## Real Analysis Exams | Department of Mathematics

Part A: real analysis (Lebesgue measure theory) Part B: complex analysis; Part C: applied analysis (functional analysis with applications to linear differential equations) Each part will contain four questions, and correct answers to two of these four will ensure a pass on that part. To pass the Analysis exam, you must either pass Part A and Part B, or Part A and Part C.

## Old Qualifying Exams | Department of Mathematics

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## Assignments | Real Analysis | Mathematics | MIT OpenCourseWare

Math 405: Introduction to Real Analysis Course Description. This is an introduction to real analysis. Topics covered in the course will include, The Logic of Mathematical Proofs, Construction and Topology of the Real Line, Continuous Functions, Differential Calculus, Integral Calculus, Sequences and Series of Functions.

## Math 405: Introduction to Real Analysis

Creative Commons license, the solutions manual is not. The author reserves all rights to the manual. TO BEVERLY. Contents Preface vi Chapter 1 The Real Numbers 1 ... useful to state them as a starting point for the study of real analysis and also to focus on one property, completeness, that is probably new to you.

## INTRODUCTION TO REAL ANALYSIS - Trinity University

Exam Schedule. Unless otherwise noted, the exams will be held each year according to the following schedule: Autumn Quarter: The exams are held during the week prior to the first week of the quarter. Spring Quarter: The exams are held during the first week of the quarter. Algebra: Tuesday, 9:30am-12:30pm and 2:00-5:00pm Real Analysis: Friday, 9:30am-12:30pm and 2:00-5:00pm

## PhD Qualifying Exams | Mathematics

REAL ANALYSIS PRELIMINARY EXAM March, 2019 INSTRUCTIONS: Do as many of the eight problems as you can. Four completely correct solutions will be a pass; a few complete solutions will count more than many partial solutions. Always carefully justify your answers. If you skip a step or omit some

### **REAL ANALYSIS PRELIMINARY EXAM**

PhD exam solutions; MA exam solutions; back to top Real and Complex Analysis (Math 630-631, 660-661) Note: This exam now only tests the material of Math 630 and Math 660, whereas it used to involve a choice of topics from Math 630-631 and Math 660-661. Aug 2011; Jan 2003--Jan 2011 (.pdf) Older, miscellaneous Analysis exams . August 1995 MA Exam ...

### **Archive of Old Qualifying Exams**

An Introduction to Classical Real Analysis, Karl R. Stromberg, AMS Chelsea Publishing, 2015 Course Description ... Practice material for the final: Final exam Spring 2011 (with solutions), Practice final Fall 2013 (with solutions), Final exam Fall 2014, and Final exam Fall 2015. Review session: Monday December 12, from 3:00pm to 5:00pm, in 509 ...

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