

**ZMATH 2016a.00746****Jacob, Niels; Evans, Kristian P.****A course in analysis. Volume I: Introductory calculus, analysis of functions of one real variable.** Hackensack, NJ: World Scientific (ISBN 978-981-4689-08-3/hbk; 978-981-4689-09-0/pbk). xxiii, 744 p. (2016).

In one sentence, this is a very good book for anyone interested in learning analysis. This almost 750-pages long book is the first of a planned series of seven volumes which are meant to cover topics from real numbers to measure theory, (partial) differential equations, functional analysis and even Lie groups. It is divided into three parts: introductory calculus, analysis in one dimension and appendices. The authors prepared the presentation in great detail, besides classical tools like a comprehensive list of symbols or subject index providing the interested reader the Greek alphabet and a nice list of mathematicians who have contributed to analysis containing names from Pythagoras, Euclid and Archimedes to Banach or Cohen. The presentation of the material is very good, one can feel the rich experience of the authors in teaching mathematics, in particular analysis. Their aim “to provide students and lecturers with a coherent text which can and should serve entire undergraduate studies in analysis” has been successfully achieved. The first part of the book is divided into 13 chapters, entitled Real numbers, Inequalities and intervals, Mathematical induction, Functions and mappings (2 chapters), Derivatives (2 chapters), Exponential and logarithmic functions, Trigonometric functions and their inverses, Investigations on functions, Integrals and rules of integration, while the second one contains 19 chapters, namely Problems with the real line, Sequences and their limits, Series, Completeness of the real numbers, Convergence criteria for series and  $b$ -adic functions, Point sets in  $\mathbb{R}$ , Continuous functions, Differentiation, Applications of the derivative, Convex functions and norms in  $\mathbb{R}^n$ , Uniform convergence and interchanging limits, Riemann integrals, The fundamental theorem of calculus, Differential equations, Improper integrals and the  $\Gamma$ -function, Power series and Taylor series, Infinite products and Gauss integrals, more on the  $\Gamma$ -function and selected topics on functions of a real variable. The appendices are almost 300 pages long and cover topics like Elementary aspects of mathematical logic, Sets and mappings, The Peano axioms, Results from elementary geometry, Trigonometric and hyperbolic functions, Completeness of  $\mathbb{R}$ , Limes superior and limes inferior and Connected sets in  $\mathbb{R}$ , that are additional to the main topic, but still of interest, providing moreover solutions to the more than 360 exercises proposed in the book. These problems are carefully selected in order to help the students to better understand the theoretical notions. In conclusion, I highly recommend this book to anyone teaching or studying analysis at an undergraduate level.

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*Classification:* I15

*Keywords:* analysis; calculus; real numbers; inequalities; intervals; mathematical induction; functions; mappings; derivatives; exponential functions; logarithmic functions; trigonometric functions; inverse functions; integrals; analysis in one dimension; sequences; limits; series; convergence criteria; continuous functions; differentiation; convex functions; norms; uniform convergence; interchanging limits; Riemann integrals; the fundamental theorem of calculus; differential equations; improper integrals; power series; Taylor series; infinite products; Gauss integrals; gamma-function  
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