V. A. ILYIN AND E. G. POZNYAK

Fundamentals of Mathematical Analysis

PART 1

A BOOK OF PROBLEMS IN ORDINARY DIFFERENTIAL EQUATIONS

M. Krasnov, Cand.Sc., A. Kiselev, Cand.Sc.
and **G. Makarenko, Cand.Sc.**

This problem book contains exercises for courses in differential equations at technical institutes. Particular attention is given to the method of isoclines for equations of the first and second order, to problems of finding orthogonal trajectories, to the use of the method of superposition in solving linear differential equations of order *n*, to linear dependence and linear independence of a system of functions, to problems of solving linear equations with constant and variable coefficients, to boundary value problems for differential equations, to integrating equations in power series, to asymptotic integration, to integrating systems of differential equations, to Lyapunov stability, and to the operator method.
Each section begins with a summary of basic facts and comprises worked-out examples of typical problems.
The book contains 967 problems a considerable portion of which have been composed by the authors themselves. There are some exercises of a theoretical nature.
The book is intended for students of technical institutes.

A BRIEF COURSE OF HIGHER MATHEMATICS

V. Kudryavtsev, D.Sc. and
B. Demidovich, D.Sc.

This textbook was written as a course in higher mathematics for university students majoring in various fields of natural sciences.
The text consists of twenty six chapters and two appendices. Each chapter contains a large number of test questions and exercises to make the subject matter more readily comprehensible. Answers are provided for all problems in the main text, and every effort has been made to ensure that they are accurate.
Translated from the fifth (1978) Russian edition.

VECTOR ANALYSIS

M. Krasnov, Cand.Sc., A. Kiselev, Cand.Sc.
and **G. Makarenko, Cand.Sc.**

This text is designed for students of engineering colleges and also for practicing engineers who feel a need to refresh their knowledge of such an important area of higher mathematics as vector analysis. Each section of the text starts out with a brief review of the essentials of theory (propositions, definitions, formulas). This is followed by detailed solutions of examples and problems.
The book contains about 300 problems to be solved by the student. They are all provided with hints and answers. The 41 drawings that accompany the text serve to help the reader in analyzing the theoretical material and problems.

V.A. ILYIN and E.G. POZNYAK

Fundamentals of Mathematical Analysis

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PART 1

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В. А. ИЛЬИН, Э. Г. ПОЗНЯК

ОСНОВЫ МАТЕМАТИЧЕСКОГО АНАЛИЗА

Часть I

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ИЗДАТЕЛЬСТВО • МИР •

PREFACE TO THE RUSSIAN EDITION

The book is based on the lectures delivered by the authors at the Physics Department of Moscow University.

In the course of systematic exposition of the material, the authors gave prominence to the most important concepts and theorems, the most significant of the latter being called fundamental theorems. The authors tried to give the formulations of new concepts and theorems not long before their direct application.

The sequence of presentation of the material corresponds to that accepted at the Physics Department of Moscow University. The chapter "Preliminary Information on the Main Concepts of Mathematical Analysis", in particular, comes before the exposition of the systematic course because this chapter deals with some very important physical problems and discusses mathematical means for their solution. Thus it becomes clear from the very beginning what problems and concepts constitute the subject matter of mathematical analysis. Our lecturing experience shows that such a preliminary elucidation of the range of problems treated in the course of the analysis makes it appreciably easier for the students to understand the basic mathematical concepts.

The authors paid due attention to the ever increasing role of computations and methods of approximation; that is why they tried to use algorithmic form in proving theorems and carrying out calculations wherever it was possible. In Chap. 12, in particular, the main emphasis is laid on the algorithmic aspect of the methods of approximation and only then is the method substantiated.

In addition to the main part of the material, the authors consider it possible to include some sections given in small type.

In writing the book, the authors borrowed some methodical techniques from the course of lectures by N.V. Efimov as well as from the well-known books by E. Goursat, De La Vallée Poussin and F. Franklin.

The authors express their deep gratitude to A.N. Tikhonov and A.G. Sveshnikov for their valuable ideas and instructions and also for their enormous help at all stages of writing this book.

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The authors consider it necessary to point out that to a large extent their pedagogical views were influenced by their talks with I.M. Vinogradov and A.A. Samarsky, to whom they are also very thankful.

V. Ilyin, E. Poznyak

PREFACE TO THE ENGLISH EDITION

The present book is a translation into English of the 4th Russian edition of *Fundamentals of Mathematical Analysis*, Part 1, published by Nauka in 1982.

The previous edition has been revised and expanded: some new material has been introduced and a number of changes made, which were called forth by the desire of the authors to improve the exposition and to reflect the growing role of computational techniques and algorithms.

The authors consider it their pleasant duty to express their gratitude to Irene Aleksanova whose thorough work on the translation of the book helped to eliminate a number of inaccuracies which occured in the Russian edition.

The authors.

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