

ZMATH 2010c.00554**Aksoy, Asuman G.; Khamsi, Mohamed A.****A problem book in real analysis.**

Problem Books in Mathematics. London: Springer (ISBN 978-1-4419-1295-4/hbk; 978-1-4419-1296-1/ebook). x, 254 p. EUR 49.95/net; £ 44.99; £ 77.50 (2010).

This volume contains a very readable collection of interesting problems of varying levels of difficulty. It is intended to build a bridge between ordinary high school or undergraduate exercises and more difficult and abstract concepts or problems. The book is so delightfully written that anyone who simply likes working on challenging problems could read it independently. The wide variety of exercises presented in this book range from the computational to the more conceptual and vary in difficulty. Prerequisites for accessing this book include basic notions on Linear Algebra and Calculus. This volume is composed of eleven chapters: 1) Elementary Logic and Set Theory; 2) Real Numbers; 3) Sequences; 4) Limits of Functions; 5) Continuity; 6) Differentiability; 7) Integration; 8) Series; 9) Metric Spaces; 10) Fundamentals of Topology; 11) Sequences and Series of Functions. Furthermore, the authors define the concepts and cite the theorems used at the beginning of each chapter. *A Problem Book in Real Analysis* is not simply a collection of problems, but it stimulates the readers to independent thinking in discovering analysis. The key features of this volume are the following: (i) contains a collection of challenging problems in elementary mathematics; (ii) is self-contained and assumes only a basic knowledge but opens the path to competitive research in the field; (iii) uses competition-like problems as a platform for training typical inventive skills; (iv) develops basic valuable techniques for solving problems in mathematical analysis on the real axis; (v) includes interesting and valuable account of ideas and methods in algebra, analysis, geometry, and number theory. A problem book review would be incomplete without the reviewer's favorite problem in the collection. I have chosen the following problem: Let $f : [0, \infty) \rightarrow \mathbb{R}$ be a differentiable function. Assume that $\lim_{x \rightarrow \infty} [f(x) + f'(x)] = 0$. Show that $\lim_{x \rightarrow \infty} f(x) = 0$. The reviewer recommends this book to all students curious about elementary real analysis and how to learn it through solving problems. Teachers would find this book to be a welcome resource for organizing their activities at a good level.

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