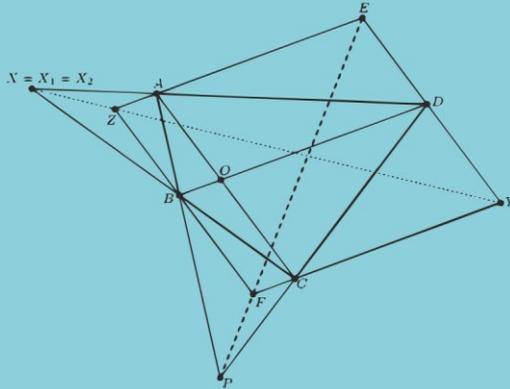


Dorin Andrica

300
PROBLEMS
FOR MATHEMATICAL COMPETITIONS

A Training Ground for Olympiad Success



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“Things are not difficult to make; what is difficult is putting ourselves in the state of mind to make them.”

Constantin Brâncuși

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From the Author

Mathematical competitions have a unique power: they challenge the mind, inspire creativity, and teach the joy of discovering elegant solutions. Beyond the pursuit of correct answers, they cultivate perseverance, clarity of thought, and an appreciation for ideas that are at once simple and profound. For over five decades, I have had the privilege of engaging with students, colleagues, and the broader mathematical community, and it is from these 55 years of experience—as a learner, teacher, problem proposer, and admirer of beautiful arguments—that this book has grown.

The book is divided into five chapters—*Algebra*, *Number Theory*, *Geometry and Trigonometry*, *Mathematical Analysis*, and *Comprehensive Problems*—each containing 60 original problems. Most are accompanied by multiple solutions, insightful remarks, and references that may prove useful for further exploration and future developments. Particular attention has been given to the diversity of methods: algebraic transformations, geometric insight, analytic techniques, and clever combinatorial reasoning often coexist within the same problem. This multiplicity of approaches is intentional, as it reflects one of the central messages of the book: that mathematical understanding deepens when a problem is viewed from different perspectives.

Many of the problems included here have appeared in journals or have been proposed in national and international competitions. They reflect not only technical difficulty, but also conceptual depth and aesthetic value. Several problems are designed to highlight classical ideas in a modern context, while others encourage generalization, abstraction, or the discovery of unexpected connections between different branches of mathematics. I was genuinely surprised and delighted to observe how some ideas originating in these problems have evolved over time, inspiring new results and alternative formulations—an illustration of the living nature of mathematics.

The *Comprehensive Problems* chapter plays a special role, bringing together techniques from multiple areas and challenging readers to synthesize their knowledge. These problems mirror real mathematical inquiry, where boundaries between subjects are often fluid and insight emerges from their interaction. Throughout the book, remarks and comments are included to guide readers toward key ideas, warn against common pitfalls, and suggest further questions worthy of exploration.

Although the primary audience includes students preparing for mathema-

tical competitions, this book is not intended as a mere collection of exercises. Rather, it is meant to serve as a training ground for mathematical thinking: learning how to experiment, how to fail productively, how to refine an idea, and how to recognize the underlying structure of a problem. Teachers may also find the material useful as a source of enrichment, inspiration for classroom discussion, or material for mathematical circles and seminars.

Writing this book would not have been possible without the support and encouragement of many colleagues and friends. I wish to express my heartfelt gratitude to Titu Andreescu, Mihai Piticari, Grigore Călugăreanu, Dan-Ștefan Marinescu, Dorian Popa, Ioan Rașa, George-Cătălin Țurcaș, Ovidiu Bagdasar, Pall Dalyai, Eugen Ionașcu, Cătălin Barbu, Vasile Șerdean, Vlad Crișan, Adrian P. Ghioca, Liana Țopan, Khoa Lu Nguyen, Șerban Buzeteanu, Gabriel Dospinescu, and Zuming Feng. Their insightful suggestions, thoughtful feedback, and unwavering support have made this work richer and more meaningful. I am also deeply grateful to the many students whose enthusiasm, originality, and persistence have continually reaffirmed my belief in the enduring value of problem solving.

It is my hope that this collection will encourage readers not only to solve problems, but to ask new questions, seek elegant arguments, and develop confidence in their own creative abilities. May these pages serve as both a challenge and an invitation—an invitation to explore, to wonder, and to experience the enduring beauty of mathematics.

February 5, 2026

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The Author

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