

# }essentials{

Guido Walz

# Equations and Inequalities

Plain Text for Non-Mathematicians

 Springer

---

essentials

**Springer essentials**

*Springer essentials* provide up-to-date knowledge in a concentrated form. They aim to deliver the essence of what counts as "state-of-the-art" in the current academic discussion or in practice. With their quick, uncomplicated and comprehensible information, essentials provide:

- an introduction to a current issue within your field of expertise
- an introduction to a new topic of interest
- an insight, in order to be able to join in the discussion on a particular topic

Available in electronic and printed format, the books present expert knowledge from Springer specialist authors in a compact form. They are particularly suitable for use as eBooks on tablet PCs, eBook readers and smartphones. *Springer essentials* form modules of knowledge from the areas economics, social sciences and humanities, technology and natural sciences, as well as from medicine, psychology and health professions, written by renowned Springer-authors across many disciplines.

More information about this subseries at <http://www.springer.com/series/16761>

---

Guido Walz

# Equations and Inequalities

Plain Text for Non-Mathematicians

 Springer

Guido Walz  
Darmstadt, Germany

ISSN 2197-6708  
essentials  
ISSN 2731-3107  
Springer essentials  
ISBN 978-3-658-32719-4  
<https://doi.org/10.1007/978-3-658-32720-0>

ISSN 2197-6716 (electronic)  
ISSN 2731-3115 (electronic)  
ISBN 978-3-658-32720-0 (eBook)

The translation was done with the help of artificial intelligence (machine translation by the service [DeepL.com](https://www.DeepL.com)). A subsequent human revision was done primarily in terms of content.

© Springer Fachmedien Wiesbaden GmbH, part of Springer Nature 2021

This work is subject to copyright. All rights are reserved by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.

The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

The publisher, the authors and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, expressed or implied, with respect to the material contained herein or for any errors or omissions that may have been made. The publisher remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Responsible Editor: Iris Ruhmann

This Springer imprint is published by the registered company Springer Fachmedien Wiesbaden GmbH part of Springer Nature.

The registered company address is: Abraham-Lincoln-Str. 46, 65189 Wiesbaden, Germany

---

## What You Can Find in This *essential*

- Formulas for solving linear and quadratic equations
- Methods for the solution of root and fractional equations
- Strategies for the solution of linear inequalities and fractional inequalities

---

# Introduction

Solving equations is an omnipresent problem when dealing with problems from natural sciences, technology or even economics. It does not necessarily have to be about higher mathematics, even simple equations like linear or quadratic ones can cause problems. These types of equations will be dealt with in the following. It is not just a matter of merely solving them, but also of dealing with equations that at first seem inaccessible, but which, after clever remodelling, turn out to be easily controllable and, above all, solvable. This includes the fractional and root equations, which are treated in the following pages.

Not quite as often as equations, but still often enough one encounters the problem of having to solve an inequality. These are also discussed below, especially linear inequalities and fractional inequalities leading to linear ones.

This booklet will help you by presenting ready-made rules for solving the above equations and inequalities and by giving you the opportunity to practice them using numerous selected examples.

Since the subtitled text is explicitly (also) aimed at non-mathematicians, it is deliberately written in generally understandable language so as not to discourage readers by using excessive technical language; after all, the subtitled text is also supposed to be “plain text.” For example, we will speak of “superscripts” instead of “exponents,” and likewise of “unknowns” instead of “variables.”

---

# Contents

<b>1 Equations</b> .....	1
<b>2 Inequalities</b> .....	33
<b>References</b> .....	51