

# Electronics and Computer Math

Seventh Edition

Bill Deem • Tony Zannini



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SEVENTH EDITION

Bill Deem  
Tony Zarnini

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## P R E F A C E

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As a top-selling text in its field, *Electronics and Computer Math* has been used in several hundred classrooms over the last six editions. The book is written for students in high schools, community colleges, and technical institutes and for technicians in the field of electronics. There are no course prerequisites for this text. It is intended to be used as a separate text in electronics math or as a text that could be used as a reference throughout the study of electronics.

*Electronics and Computer Math* provides a thorough, complete, and practical study of electronics math and its relationship to the world of electronics. The mathematical topics chosen are those that the authors feel are most useful in solving electronics problems. As such, this book places greater emphasis on certain areas of the discipline than does abstract math. The grouping and sequencing of topics are designed to support various configurations of related courses in DC, AC, and digital electronics.

Because the calculator is an integral part of all technical students' classroom tools, the use of the calculator in problem solving is introduced in the text as the need arises. Algorithms are presented when appropriate.

To reinforce new concepts and to help students test their understanding of the material, *Electronics and Computer Math* features:

- Key Concept highlights
- over 300 examples
- over 1300 practice problems within chapters
- over 2600 end-of-chapter problems
- chapter summary tables
- self-tests at the end of topics

If the text is being used for self-study, the self-tests can be used to determine whether or not the student already possesses that skill. To ensure accuracy, technical reviewers have worked every example, practice problem, self-test, and end-of-chapter problem. In addition, each supplement has been technically checked by additional technical reviewers.

## CHANGES IN THIS EDITION

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Although the title of the seventh edition has been changed to *Electronics and Computer Math*, it retains all of the material from the sixth edition. In addition, it incorporates numerous ideas suggested by instructors who have used previous editions for many years.



## **New Title**

The most obvious change in this edition is the new title, which reflects changes in technology. Today's electronics technicians must not only know how to work with computers, they must also know how computers work. Section six combines three chapters from the previous edition into one section, "Math for Digital Electronics," which is important for the understanding of how computers work. In addition, some of the new example and end-of-chapter problems are taken from the computer field.

## **New Co-author Tony Zannini**

A less obvious change is the addition of a co-author. Tony Zannini has joined Bill Deem in the development of this edition. Tony brings his experience as an electronics design engineer (over twenty years) and his experience in the education field (over ten years in electronics, computers, and math) to help students understand the math principles upon which all electronics and computers are built.

## **Arrangement of Chapters**

We have, in general, retained the previous order of the chapters. Twenty-six of the twenty-eight chapters remain in the same order as in the previous edition. The biggest change is that the chapter "Computer Number Systems" has been moved from Chapter 4 in the sixth edition to Chapter 25 in this edition, so that it directly precedes the chapter on Boolean algebra. The other change is that the chapter "Fractions, Decimals, and Percents," which does not include any algebraic concepts, now precedes "Algebraic Terms: Roots and Powers."

## **Section Organization**

Upon examining the table of contents, you will notice that the chapters have now been divided into seven sections:

- Section 1—Review of Arithmetic
- Section 2—Algebra Fundamentals
- Section 3—Math for DC Electronics
- Section 4—Math for AC Electronics
- Section 5—Logarithms in Electronics
- Section 6—Math for Digital Electronics
- Section 7—Introduction to Statistics in Electronics

This helps students see the relationship between math topics, other courses in their curriculum, and applications in technology. The grouping also helps guide instructors

adjust the order in which math topics are taught because of changes in course offerings from term to term.

Sections 1 and 2 should be taught in sequence, and can be covered quickly with advanced math students. Section 3, “Math for DC Electronics,” would normally follow Section 2; however Section 5, 6, or 7 could follow Section 2 if those math topics were needed to support other courses.

Section 3 (Chapters 10 through 14) is designed to be taught in a program where a course in basic electronics is taught concurrently. Chapters 10, 11, and 12 provide support for the principles usually taught in a DC electronics class. Chapters 13, “Graphing,” and 14, “Simultaneous Linear Equations,” can be used to solve some of the problems in Chapters 10, 11, and 12 but are not dependent on them so they can be taught any time after Section 2.

Section 4, “Math for AC Electronics,” (Chapters 15 through 21) is normally taught after Section 3, “Math for DC Electronics.” Chapter 13 is a prerequisite for Chapters 15, “Complex Numbers,” and 16, “The Right Triangle.” The three chapters on AC circuits, like the three on DC circuits, provide support for the principles taught in an electronics class.

Sections 5, 6, and 7 can be taught in any order after Section 2. Usually the sequence is dictated by the math support required by other courses.

## **Estimating**

New to this edition is a discussion on an estimating technique that uses scientific notation and rounding in Chapter 2. Making quick mental mathematical estimates is helpful when troubleshooting electronic circuits, verifying calculator answers, and taking timed pre-employment tests when calculators are not allowed.

## **Calculator Usage**

The instructions for using a calculator have been expanded. We continue to provide the instructions for the Texas Instruments TI-36X and we have added instructions for the Casio fx-115W. Both are low-cost, popular, scientific calculators and most keystrokes are the same for both calculators. We point out the instructions for the Casio when they are different from the TI. Students who are already calculator proficient can easily skip these instructions.

## **New Word Problems**

We have added some math problems that are stated with words rather than numeric symbols. Technicians often have to translate written or verbal descriptions of problems into math symbols before they can begin a solution.

## CHAPTER ORGANIZATION

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Chapters 1, 2, and 3 deal with decimal numbers, powers of ten, and prefixes. These chapters introduce the student to the calculator and to problem solving involving electrical units.

Chapter 4 reviews addition, subtraction, multiplication, and division of fractions. Conversions between mixed numbers and decimal fractions and finding common denominators are covered.

Chapter 5 introduces the student to algebraic terms, roots, and powers. Typical electrical problems involving literal numbers, squares, and square roots are solved using the calculator. Chapters 6 through 9 contain topics in algebra, including linear equations, second-degree equations, fractional equations, and factoring. Throughout these chapters, problem solving applications using the calculator are presented.

In Chapters 10 through 12, student use the algebraic skills they developed in Chapters 6 through 9 to solve dc circuit problems using Kirchhoff's and Ohm's law, and Thévenin's, Norton's, and the superposition circuit theorems. Graphical and algebraic solutions to circuit problems and linear equations are presented in Chapters 13 and 14. Practical applications are presented for each technique discussed.

Chapters 15 through 18 introduce algebra and trigonometry elements needed to solve ac circuit problems. Angular velocity and the sine wave are introduced in these chapters. Problem solving using trigonometric functions and the calculator is presented. In Chapters 19 through 21, ac series, parallel, and complex circuit problems are solved. In Chapter 19, the student learns how to express phasors in either polar or rectangular form. In Chapter 20, circuit theorems are again presented as an aid in solving complex circuit problems. These problem-solving techniques are used in Chapter 21 in determining the parameters for several types of filter circuits.

Chapters 22, 23, and 24 cover both common and natural logarithms and their applications. Logarithmic equations are covered in Chapter 23. Applications including the Bode plot are found in Chapter 24.

Chapter 25 presents the various number systems (binary, octal, and hexadecimal) that are used in the study of computers. Conversions between the number systems and addition and subtraction in these systems are covered. Chapter 26 discusses the basic logic functions inherent in all logic circuits and presents those theorems, laws, and postulates used in the simplification of logic expressions. Chapter 27, Karnaugh Maps, offers an alternative method of logic circuit simplification.

In Chapter 28, Introduction to Statistics, we introduce the student to frequency distribution tables, histograms, measures of central tendency, and the normal curve.

## EXTENSIVE SUPPLEMENTS PACKAGE

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*Electronics and Computer Math* comes with a wide variety of optimal supplements for both the instructor and student.

- A **Student Study Guide with Selected Solutions** (ISBN 0-13-048782-1) contains chapter overviews and additional study questions for each chapter. It includes fully worked-out solutions to selected end-of-chapter problems.
- An **Instructor's Solutions Manual with PowerPoint slides** (ISBN 0-13-091128-3) contains fully worked-out solutions to end-of-chapter problems and provides the instructor with over 120 illustrations to use.
- An **Instructor's Test Item File** (ISBN 0-13-091131-3) contains 1000 additional test questions. It is also available in computerized format.
- A **Companion Website** (ISBN 0-13-091120-8) can be accessed at [www.prenhall.com/deem](http://www.prenhall.com/deem). It includes an online study guide with practice problems, Syllabus Manager™, and links to other resources on the Web.
- A Study Wizard continuing multiple-choice questions is found on the CD-ROM packaged with the text.

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Bill Deem  
Tony Zannini



**Section 1   Review of Arithmetic   1**

- 1   Decimal Number System   3**
- 2   Powers of Ten   35**
- 3   Units and Prefixes   81**
- 4   Fractions, Decimals, and Percents   108**

**Section 2   Algebra Fundamentals   155**

- 5   Algebraic Terms: Roots and Powers   157**
- 6   Fractions and Literal Numbers   179**
- 7   Linear Equations   203**
- 8   Factoring Algebraic Expressions   228**
- 9   Fractional Equations   251**

**Section 3   Math for DC Electronics   273**

- 10   DC Circuit Analysis: Kirchhoff's Laws   275**
- 11   DC Circuit Analysis: Ohm's Law   302**
- 12   DC Circuit Analysis: Circuit Theorems   339**
- 13   Graphing   380**
- 14   Simultaneous Linear Equations   415**

**Section 4   Math for AC Electronics   449**

- 15   Complex Numbers   451**
- 16   The Right Triangle   465**
- 17   Trigonometric Identities   494**
- 18   AC Fundamentals   506**

<b>19</b>	AC Circuit Analysis: Series Circuits	531
<b>20</b>	AC Circuit Analysis: Parallel Circuits	568
<b>21</b>	Filters	599

<b>Section 5</b>	Logarithms in Electronics	615
<b>22</b>	Logarithms	619
<b>23</b>	Logarithmic Equations	639
<b>24</b>	Applications of Logarithms	652

<b>Section 6</b>	Math for Digital Electronics	673
<b>25</b>	Computer Number Systems	675
<b>26</b>	Boolean Algebra	722
<b>27</b>	Karnaugh Maps	769

<b>Section 7</b>	Introduction to Statistics in Electronics	787
<b>28</b>	Introduction to Statistics	789
	Appendix A The Calculator	828
	Appendix B Trigonometric Functions of Degrees	831
	Appendix C Answers to Selected Problems	842
	Index	883

## **Section 1    Review of Arithmetic    1**

### **1    The Decimal Number System    3**

- 1-1    Decimal Number System    4
- 1-2    Decimal Fractions    6
- 1-3    Whole Numbers and Fractions    10
- 1-4    Rounding Whole Numbers    13
- 1-5    Rounding Nonwhole Numbers    15
- 1-6    Significant Digits    16
- 1-7    Addition and Subtraction of Signed Numbers    19
- 1-8    Multiplication and Division of Signed Numbers    21
- 1-9    Mathematical Expressions and Terms    23
- 1-10    Parentheses and Other Signs of Grouping    24

### **2    Powers of Ten    35**

- 2-1    Converting Numbers to Powers of Ten Form    36
- 2-2    Converting from Powers of Ten Form to Numbers    38
- 2-3    Converting Decimal Fractions to Powers of Ten Form    38
- 2-4    Converting Powers of Ten to Decimal Fractions    40
- 2-5    Multiplication in Powers of Ten Form    41
- 2-6    Division in Powers of Ten Form    42
- 2-7    Combined Multiplication and Division in Powers of Ten Form    44
- 2-8    Converting between Regular Numbers and Powers of Ten  
Notation    47
- 2-9    Expressing Numbers Greater Than One in Scientific Notation    49
- 2-10    Expressing Numbers Less Than One in Scientific Notation    51
- 2-11    Multiplication and Division    52
- 2-12    Addition and Subtraction    57
- 2-13    Estimating    59
- 2-14    Problems with Complex Denominators    61
- 2-15    Reciprocals    62
- 2-16    Powers and Roots in Base Ten    65
- 2-17    Square and Cube Roots of Powers of Ten    66
- 2-18    Squaring Numbers    67
- 2-19    Square Roots of Numbers    69

### **3 Units and Prefixes 81**

3-1	Units	82
3-2	Prefixes	86
3-3	Converting Numbers with Prefixes to Basic Units	89
3-4	Changing Prefixes	90
3-5	Applications	92
3-6	Systems of Measurement	97

### **4 Fractions, Decimals, and Percents 108**

4-1	Prime Numbers and Prime Factors	108
4-2	Reducing Fractions To Lowest Terms	110
4-3	Multiplication of Fractions	113
4-4	Division of Fractions	115
4-5	Addition and Subtraction of Fractions	118
4-6	Lowest Common Multiple	122
4-7	Adding and Subtracting Fractions with Unlike Denominators	124
4-8	Improper Fractions and Mixed Numbers	128
4-9	Multiplication and Division of Improper Fractions	132
4-10	Addition and Subtraction of Improper Fractions	134
4-11	Decimals	137
4-12	Fraction to Decimal to Percentage Conversions	141

## **Section 2 Algebra Fundamentals 155**

### **5 Algebraic Terms: Roots and Powers 157**

5-1	Numbers, Expressions, and Terms	157
5-2	Exponents	159
5-3	Finding Values of Algebraic Expressions	166
5-4	Roots	163
5-5	Practical Applications—dc Circuits	166
5-6	Practical Applications—ac Circuits	170

### **6 Fractions and Literal Numbers 179**

6-1	Prime Numbers	179
6-2	Lowest Common Multiple	180
6-3	Multiplication of Monomials	183
6-4	Division of Monomials	184
6-5	Multiplication of Fractions	187
6-6	Division of Fractions	189
6-7	Adding and Subtracting Fractions with Common Denominators	191
6-8	Adding and Subtracting Fractions with Unlike Denominators	193

## **7 Linear Equations 203**

- 7-1 Linear Equations 204
- 7-2 Second-Degree Equations 212
- 7-3 Applications 217

## **8 Factoring Algebraic Expressions 228**

- 8-1 Multiplication of Polynomials by Monomials—Whole Numbers 228
- 8-2 Multiplication of Polynomials by Monomials—Fractional Numbers 231
- 8-3 Multiplication of Binomials by Binomials 232
- 8-4 Division of Polynomials 235
- 8-5 Factoring Polynomials 240
- 8-6 Factors of Trinomials 242

## **9 Fractional Equations 251**

- 9-1 General Equations 251
- 9-2 Some Real Equations 256
- 9-3 Applications 259
- 9-4 Quadratic Equations 262

## **Section 3 Math for DC Electronics 273**

### **10 DC Circuit Analysis: Kirchhoff's Laws 275**

- 10-1 Kirchhoff's Current Law 276
- 10-2 Kirchhoff's Voltage Law 284
- 10-3 Polarity 290

### **11 DC Circuit Analysis: Ohm's Law 302**

- 11-1 Circuit Resistance in Series and Parallel Circuits 303
- 11-2 Resistance in Series-Parallel Circuits 307
- 11-3 Ohm's Law: Series Circuits 311
- 11-4 Ohm's Law: Parallel Circuits 316
- 11-5 Ohm's Law: Series-Parallel Circuits 322

### **12 DC Circuit Analysis: Circuit Theorems 339**

- 12-1 Superposition Theorem 339
- 12-2 Thévenin's Theorem 348
- 12-3 Thévenin's Theorem and Complex Circuits 353
- 12-4 Norton's Theorem 364



## **13 Graphing 380**

- 13-1 Plotting Points on a System of Rectangular Coordinates 382
- 13-2 Graphing Linear Equations 385
- 13-3 Slope of a Line 390
- 13-4 Slope-Intercept Form 394
- 13-5 Interpreting Graphs 397
- 13-6 Plotting Curves 402

## **14 Simultaneous Linear Equations 415**

- 14-1 Graphical Solution 415
- 14-2 Solution by Addition or Subtraction 418
- 14-3 Solution by Substitution 420
- 14-4 Second-Order Determinants 422
- 14-5 Third-Order Determinants 425
- 14-6 Applications—Circuits with One Source 429
- 14-7 Applications—Circuits with Two Sources 435

## **Section 4 Math for AC Electronics 449**

### **15 Complex Numbers 451**

- 15-1 Imaginary Numbers 452
- 15-2 Complex Numbers 455
- 15-3 Addition and Subtraction of Complex Numbers 458
- 15-4 Multiplication and Division of Complex Numbers 459

### **16 The Right Triangle 465**

- 16-1 Sides and Angles 466
- 16-2 Pythagorean Theorem 468
- 16-3 Trigonometric Functions 472
- 16-4 Trigonometric Tables 475
- 16-5 Inverse Trig Functions 480
- 16-6 Trigonometric Equations 482

### **17 Trigonometric Identities 494**

- 17-1 Law of Sines 495
- 17-2 Law of Cosines 501

### **18 AC Fundamentals 506**

- 18-1 The Sine Wave 507
- 18-2 Angular Velocity 513

18-3	Instantaneous Values of Voltage and Current	515
18-4	RMS Values of Voltage and Current	519
18-5	Angle of Lead or Lag	521

## **19 AC Circuit Analysis: Series Circuits 531**

19-1	Series <i>RC</i> Circuits—Finding Voltages and Phase Angles	532
19-2	Series <i>RC</i> Circuits—Resistance, Reactance, and Impedance	534
19-3	Series <i>RL</i> Circuits—Finding Voltages and Phase Angles	539
19-4	Series <i>RL</i> Circuits—Resistance, Reactance, and Impedance	541
19-5	Polar to Rectangular Conversion	545
19-6	Addition and Subtraction of Phasors	550
19-7	Equivalent Series Circuit	552
19-8	Series Resonance	555

## **20 AC Circuit Analysis: Parallel Circuits 568**

20-1	<i>RC</i> Circuit Analysis—Circuit Currents	569
20-2	<i>RC</i> Circuit Analysis—Circuit Parameters	571
20-3	<i>RL</i> Circuit Analysis—Circuit Currents	573
20-4	<i>RL</i> Circuit Analysis—Circuit Parameters	576
20-5	Equivalent Circuits—Phasors	579
20-6	Equivalent Circuits—Parallel–Series Conversions	581
20-7	ac Networks—Transforms	584
20-8	ac Networks—Problem Solving	587

## **21 Filters 599**

21-1	Low-Pass and High-Pass Filters	600
21-2	Thévenin's and Norton's Theorem	601
21-3	Band-Pass Filters	605

## **Section 5 Logarithms in Electronics 617**

### **22 Logarithms 619**

22-1	Common Logarithms	619
22-2	Finding the Logarithms of Numbers Between 1 and 10	621
22-3	Finding the Logarithms of Numbers Greater Than 10	622
22-4	Finding the Logarithms of Numbers Less Than 1	624
22-5	Multiplication of Numbers by Using Logarithms	625
22-6	Division of Numbers by Using Logarithms	628
22-7	Raising a Number of a Power by Using Logarithms	630
22-8	Natural Logarithms	631

## **23    Logarithmic Equations    639**

23-1	Logarithmic and Exponential Forms	639
23-2	Logarithmic Equations: Common Logs	641
23-3	More Common Logarithmic Equations	643
23-4	Logarithmic Equations: Natural Logs	645
23-5	More Natural Logarithmic Equations	647

## **24    Applications of Logarithms    652**

24-1	Gain Measurements	652
24-2	Frequency Response	657
24-3	Amplifier Gain and the Bode Plot	659
24-4	RC Circuits	665

## **Section 6    Math for Digital Electronics    673**

### **25    Computer Number Systems    675**

25-1	Binary Number System	676
25-2	Octal Number System	683
25-3	Hexadecimal Number System	686
25-4	Binary to Octal to Hexadecimal Conversions	689
25-5	Binary to Octal to Decimal to Hexadecimal Conversions	692
25-6	Decimal and Octal Addition	694
25-7	Adding Hexadecimal Numbers	697
25-8	Adding Binary Numbers	698
25-9	Decimal and Octal Subtraction	701
25-10	Subtracting Hexadecimal Numbers	703
25-11	Subtracting Binary Numbers	704
25-12	Complement Method of Subtraction	706
25-13	Sixteen's and Eight's Complement	711

## **26    Boolean Algebra    722**

26-1	Logic Gates	722
26-2	Boolean Postulates and Theorems	732
26-3	De Morgan's Theorem and the Absorption Theorem	741
26-4	Application Problems	751

## **27    Karnaugh Maps    769**

27-1	Two- and Three-Variable Expressions	769
27-2	Four-Variable Expression	777

**Section 7 Introduction to Statistics in Electronics 787**  
**28 Introduction to Statistics 789**

- 28-1 Frequency Distribution 790
- 28-2 Measures of Central Tendency 802
- 28-3 Standard Deviation 810
- 28-4 The Normal Curve 814

**A The Calculator 827**

**B Trigonometric Functions of Degrees 830**

**C Answers to Selected Problems 841**

**Index 883**