

Solutions to Abstract Algebra (Dummit and Foote 3e)

Chapter 1 : Group Theory

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February 11, 2012

This work was done as an undergraduate student: if you really don't understand something in one of these proofs, it is very possible that it doesn't make sense because it's wrong. Any questions or corrections can be directed to jason.rosendale@gmail.com.

Exercise 1.1.1

(a) is not associative: $3 - (2 - 1) \neq (3 - 2) - 1$. (b),(c),and (d) can be shown to be associative by grinding out the algebra and showing that $a * (b * c) = (a * b) * c$. (e) is not associative, as can be shown by letting $a = b = c = 2$.

Exercise 1.1.2

(a) and (e) can be shown to not be commutative by letting $a = 1, b = 2$. (b),(c) and (d) can be shown to be commutative by grinding out the algebra.

Exercise 1.1.3

$$\begin{aligned}\overline{a+b+c} \\ &= \overline{a+b} + c \quad \text{def. of modular addition} \\ &= \overline{a+b+c} \quad \text{def. of modular addition}\end{aligned}$$

Exercise 1.1.4

$$\begin{aligned}\overline{ab} \cdot c \\ &= \overline{a \cdot b} \cdot c \quad \text{def. of modular multiplication} \\ &= \overline{a \cdot bc} \quad \text{def. of modular multiplication}\end{aligned}$$

Exercise 1.1.5

To be a group, each element a would need a multiplicative inverse b such that $ab = 1$; but $\mathbb{Q}$ has no such inverse.

Exercise 1.1.6

(b) is not closed: $1/14 + 1/14 = 1/7$. (c) is not closed: $2/3 + 2/3 = 4/3$. (d) is not closed: $2 + (-3/2) = 1/2$. (f) is not closed: $1/2 + 1/3 = 5/6$. (a) and (e) are groups under addition.

Exercise 1.1.7

That $x * y$ is well-defined follows directly from the fact that $+\cdot,$ and the greatest integer function are well defined on $\mathbb{R}$. To prove that G is a group: G has an identity element ($0 \in G$ and $0 * x = x * 0 = x - [x] = 0$), each

Algebra Dummit Foote Solutions Manual

Tom Carson, Ellyn Gillespie, Bill Jordan



Algebra Dummit Foote Solutions Manual:

Abstract Algebra Manual Ayman Badawi, 2004 This is the most current textbook in teaching the basic concepts of abstract algebra The author finds that there are many students who just memorise a theorem without having the ability to apply it to a given problem Therefore this is a hands on manual where many typical algebraic problems are provided for students to be able to apply the theorems and to actually practice the methods they have learned Each chapter begins with a statement of a major result in Group and Ring Theory followed by problems and solutions Contents Tools and Major Results of Groups Problems in Group Theory Tools and Major Results of Ring Theory Problems in Ring Theory Index *A Classical Introduction to Galois Theory* Stephen C. Newman, 2012-05-29 Explore the foundations and modern applications of Galois theory Galois theory is widely regarded as one of the most elegant areas of mathematics A Classical Introduction to Galois Theory develops the topic from a historical perspective with an emphasis on the solvability of polynomials by radicals The book provides a gradual transition from the computational methods typical of early literature on the subject to the more abstract approach that characterizes most contemporary expositions The author provides an easily accessible presentation of fundamental notions such as roots of unity minimal polynomials primitive elements radical extensions fixed fields groups of automorphisms and solvable series As a result their role in modern treatments of Galois theory is clearly illuminated for readers Classical theorems by Abel Galois Gauss Kronecker Lagrange and Ruffini are presented and the power of Galois theory as both a theoretical and computational tool is illustrated through A study of the solvability of polynomials of prime degree Development of the theory of periods of roots of unity Derivation of the classical formulas for solving general quadratic cubic and quartic polynomials by radicals Throughout the book key theorems are proved in two ways once using a classical approach and then again utilizing modern methods Numerous worked examples showcase the discussed techniques and background material on groups and fields is provided supplying readers with a self contained discussion of the topic A Classical Introduction to Galois Theory is an excellent resource for courses on abstract algebra at the upper undergraduate level The book is also appealing to anyone interested in understanding the origins of Galois theory why it was created and how it has evolved into the discipline it is today [Subject Guide to Books in Print](#) , 1975 **Books in Print Supplement** , 2002 **Solutions Manual to accompany Introduction to Abstract Algebra, 4e** W. Keith Nicholson, 2012-05-15 An indispensable companion to the book hailed an expository masterpiece of the highest didactic value by Zentralblatt MATH This solutions manual helps readers test and reinforce the understanding of the principles and real world applications of abstract algebra gained from their reading of the critically acclaimed Introduction to Abstract Algebra Ideal for students as well as engineers computer scientists and applied mathematicians interested in the subject it provides a wealth of concrete examples of induction number theory integers modulo n and permutations Worked examples and real world problems help ensure a complete understanding of the subject regardless of a reader's background in mathematics [Whitaker's Book List](#)

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