Elementary Abstract Algebra: Examples and Applications

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Material from "Abstract Algebra, Theory and Applications" by Thomas Judson may be found throughout much of the book. A current version of "Abstract Algebra, Theory and Applications" may be found at abstract.ups.edu.

Chapters 4 and 5 are largely based on "Proofs and Concepts"(version 0.78, May 2009) by Dave Witte Morris and Joy Morris, which may be found online at:

https://archive.org/details/flooved3499, or
http://people.uleth.ca/~dave.morris/books/proofs+concepts.html

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Please send comments and corrections to: thron@tamuct.edu. You may also request the LaTeX source code from this same email address.

YouTube videos are available: search on YouTube for the title of this book.

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Math 301 Fall 2015 Test 1

(1) Evaluate: $\dfrac{(\overline{3+8i})}{7+6i}$.

(2) Given the expression: $(((a-b)+b)+b)(a-b)+b^2$

   (a) Simplify the expression using the associative law ONLY.

   (b) Simplify the expression using the associative and distributive laws ONLY.

   (c) Simplify the expression using the associative, distributive, and commutative laws.

(3) A cubic polynomial of the form x^3+ax^2+bx+c (a, b, c are real) has roots 11 and $3-i$. Find a, b, c.

(4) Compute: $\mathrm{mod}(30!, 19)$. (Note: 30! means $1 \cdot 2 \cdot 3 \cdot \ldots \cdot 30$.)

(5) Find all solutions to: $367x \equiv 187 \bmod 182$. (Note: reduce *before* solving.)

(6) Perform the following matrix multiplication mod 37. Simplify *before* multiplying:

$$\begin{pmatrix} 409 & 372 \\ 743 & 189 \end{pmatrix} \begin{pmatrix} -105 & 410 \\ -300 & -225 \end{pmatrix}$$