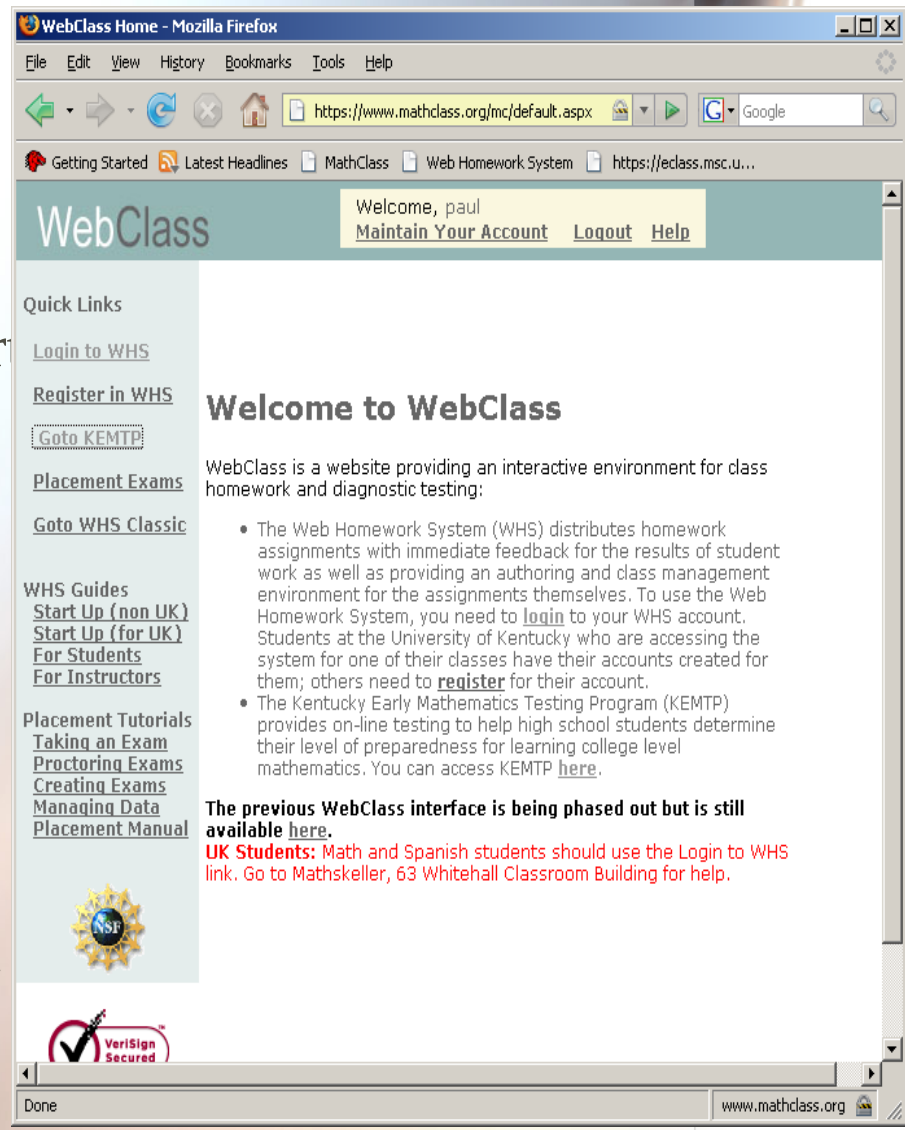
Math Sciences R&D

Technology, Courses, Texts, and Instructional Materials, etc.

Kentucky Partnership System

by K.K. Kubota

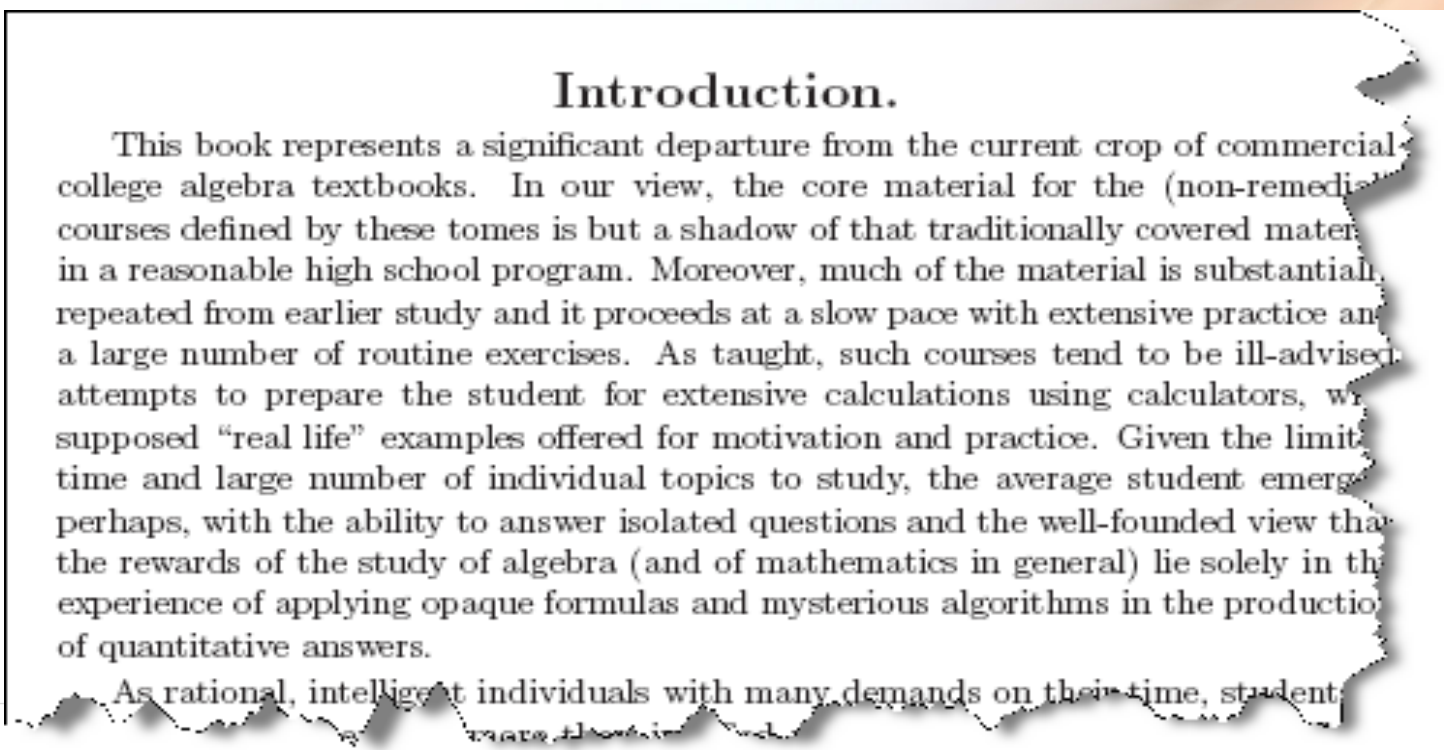
- –Major software system
  - •Over half million lines of code
- –Technical infrastructure for partnership development and support for activities such as:
  - •Kentucky Early Mathematics Testing Program
    - –http://www.mathclass.org -> GO TO KEMTP
  - •Kentucky Online Testing (KYOT)
    - –Statewide placement exam system
    - – http://www.mathclass.org >Placement Exams



- Instructional Support (WHS)
  - Web homework for 5000 students
    - Mathematics, Spanish
    - http://www.mathclass.org ->Login to WHS
  - Distance learning in Mathematics
    - Access to Algebra professional development program for secondary math teachers
    - Alternative approaches to dual credit
  - Tools, methods for distributed, ongoing curriculum development and dissemination.

College Algebra by Avinash Sathaye

- A challenging college algebra text of 190 pages with additional, extensive web homework problems on WHS
- Developed with support from AMSP
- Text for Access to Algebra program
- Open source – a duplicated copy with cover typically costs about $18.
- **http://www.ms.uky.edu/~sohum/ma109_fa07/fa07_edition/ma109fa07.pdf**



Introduction.

This book represents a significant departure from the current crop of commercial college algebra textbooks. In our view, the core material for the (non-remedi courses defined by these tomes is but a shadow of that traditionally covered mater in a reasonable high school program. Moreover, much of the material is substantiall repeated from earlier study and it proceeds at a slow pace with extensive practice an a large number of routine exercises. As taught, such courses tend to be ill-advised attempts to prepare the student for extensive calculations using calculators, w supposed "real life" examples offered for motivation and practice. Given the limit time and large number of individual topics to study, the average student emerg perhaps, with the ability to answer isolated questions and the well-founded view tha the rewards of the study of algebra (and of mathematics in general) lie solely in th experience of applying opaque formulas and mysterious algorithms in the productio of quantitative answers.

As rational, intelligent individuals with many demands on their time, student

Precalculus with Geometry and Trigonometry (fall 2007) by Avinash Sathaye

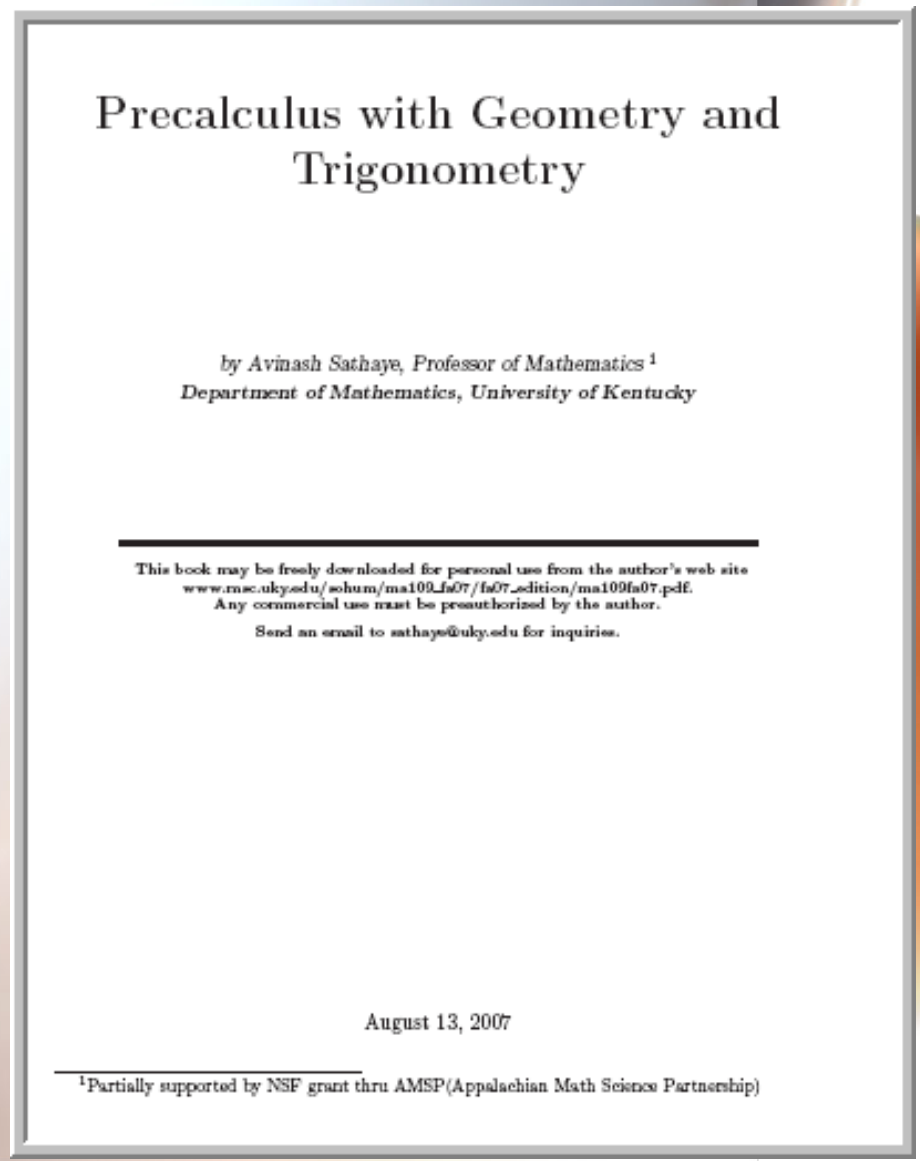
- Extension of College Algebra Text to include geometry and trigonometry

•Used for precalculus at UK in fall 2007 to be revised and used in fall 2008

•Complete set of online homework in WHS format

•Freely available (pdf, 256 pages) at

http://www.ms.uky.edu/~sohum/ma110/text/ma110_fa07.pdf



Precalculus with Geometry and Trigonometry

by Avinash Sathaye, Professor of Mathematics [1]
Department of Mathematics, University of Kentucky

This book may be freely downloaded for personal use from the author's web site www.ms.uky.edu/sohum/ma109_fa07/fa07_edition/ma109fa07.pdf.
Any commercial use must be preauthorized by the author.

Send an email to sathaye@uky.edu for inquiries.

August 13, 2007

[1]Partially supported by NSF grant thru AMSP(Appalachian Math Science Partnership)

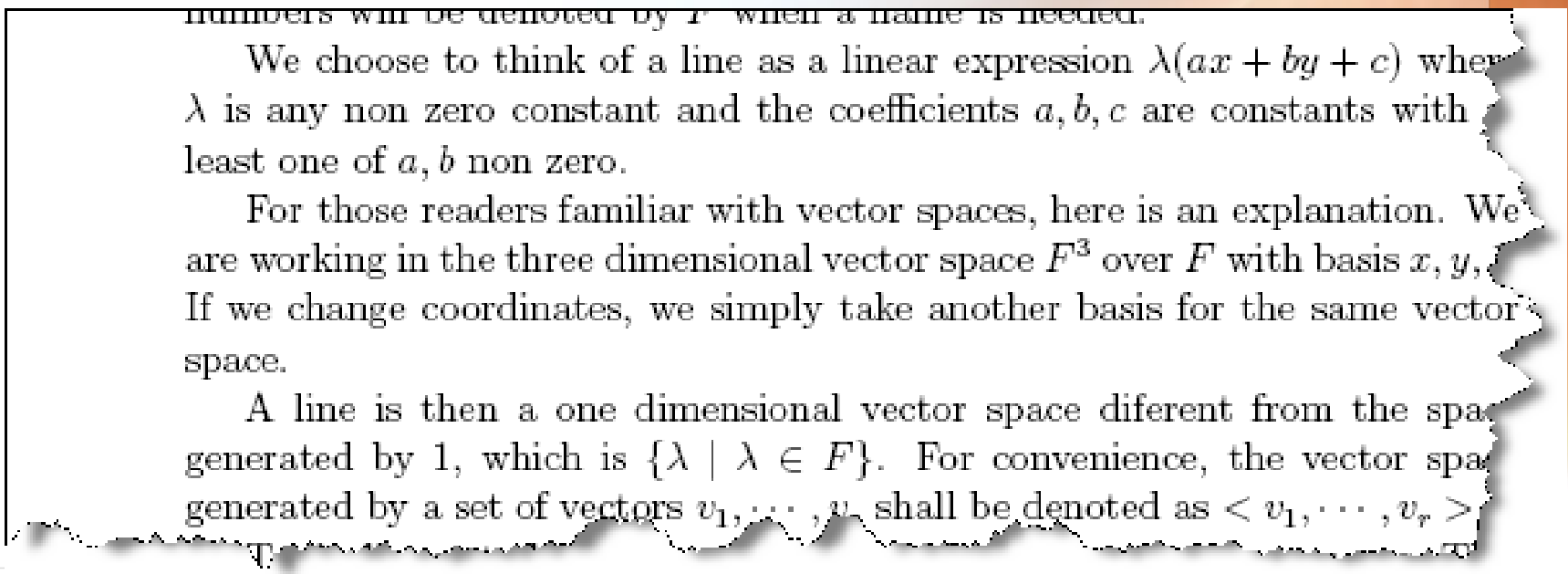
A course for Teachers of College Algebra

(summer 07) Avinash Sathaye

- A coordinate-free course on the material in Sathaye's College Algebra text for teachers
- Part of the teacher professional development program for Access to Algebra
- supplement to the student text
- Developed with support from AMSP

http://www.msc.uky.edu/sohum/ma502/ma502_sp07index.html

- Developed with AMSP support



numbers will be denoted by F when a name is needed.

We choose to think of a line as a linear expression $\lambda(ax + by + c)$ whe λ is any non zero constant and the coefficients a, b, c are constants with least one of a, b non zero.

For those readers familiar with vector spaces, here is an explanation. We are working in the three dimensional vector space F^3 over F with basis $x, y,$ If we change coordinates, we simply take another basis for the same vector space.

A line is then a one dimensional vector space diferent from the spa generated by 1, which is $\{\lambda \mid \lambda \in F\}$. For convenience, the vector spa generated by a set of vectors $v_1, \cdots, v_r$ shall be denoted as $< v_1, \cdots, v_r >$

MCtools with Latextools by Carl Eberhart

- A large Maple macro package for the creation of multi-versioned, WHS format web-based problem sets and multi-versioned traditional examinations in LaTeX format
  - Developed with support from AMSP
  - Diagram creation tools
  - Problems can reference arbitrary sets of standards
    - Kentucky Core Content, Tennessee math instruction standards, and American Diploma Project standards are part of the package
  - Freely shared at http://www.msc.uky.edu/carl/communicating_math/MCtools_page.htm
  - Most recent version us 3/23/08

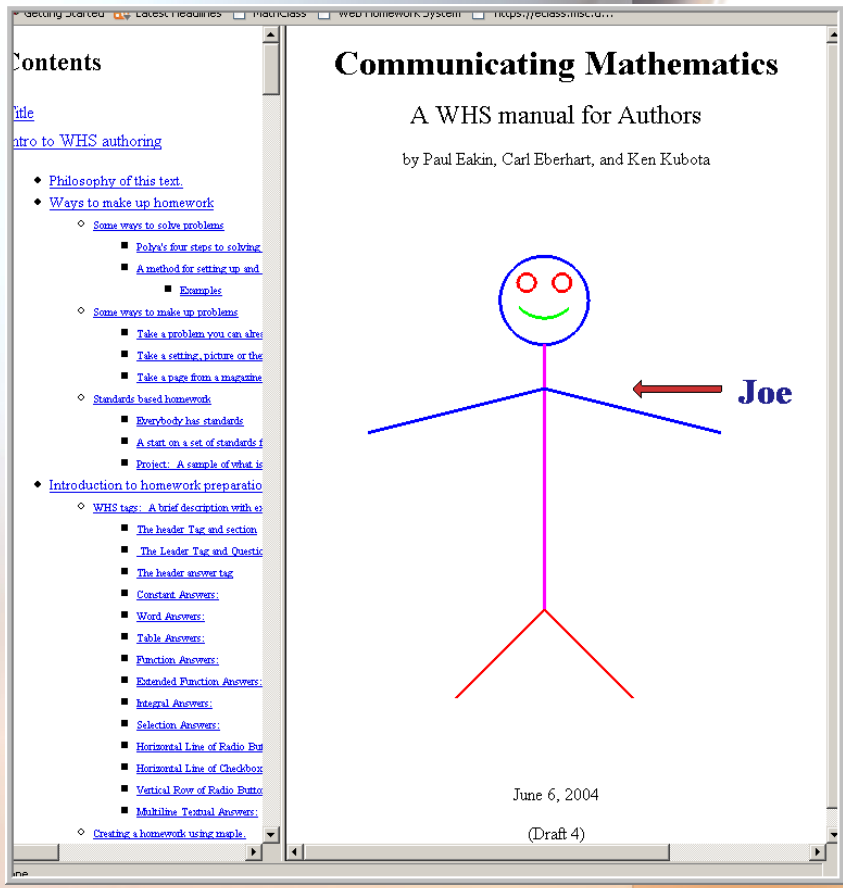
Manual for WHS Authors (June 2004)

by Paul Eakin, Carl Eberhart, and Ken Kubota

–Complete text for *Communicating Mathematics* problem solving course which teaches problem solving through the creation and implementation of web-based homework assignments on the (open source) WHS system

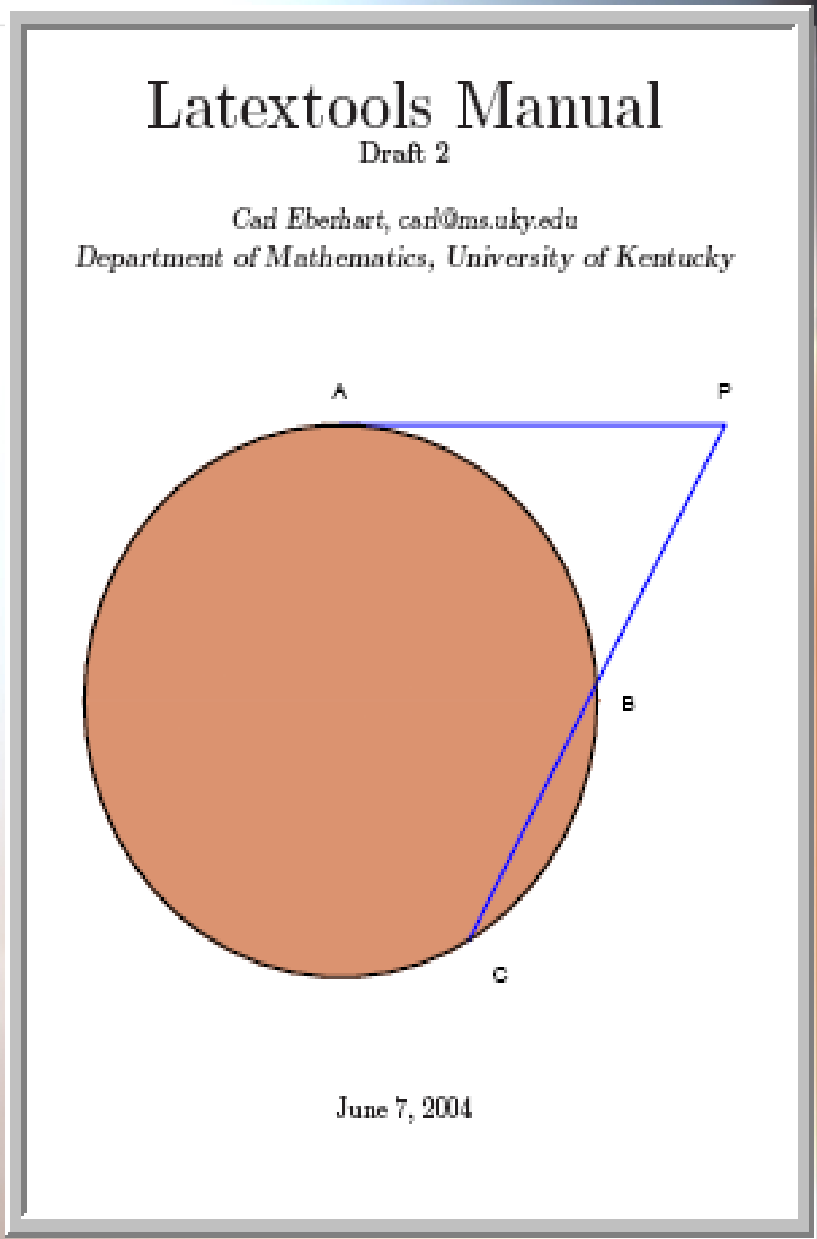
–Text is open source in html and pdf (238 pages) versions

http://www.msc.uky.edu/carl/communicating_math/MCtools_page.htm



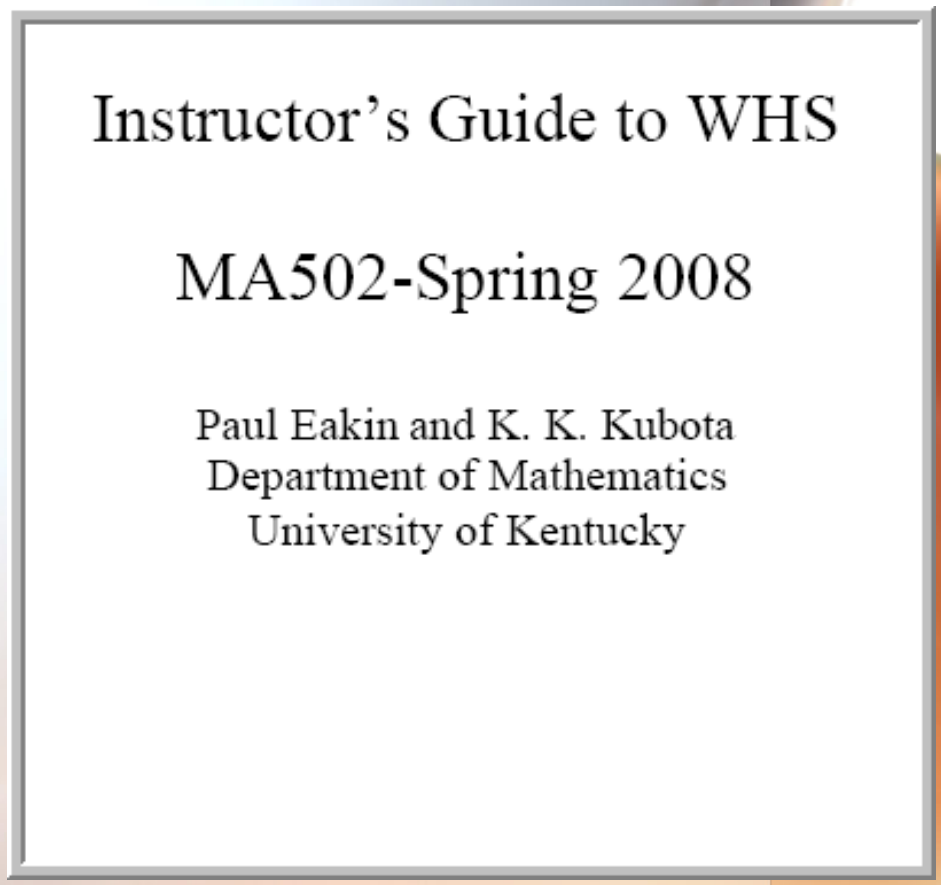
Latextools Manual by Carl Eberhart

- Manual for the Latextools package
- Html and pdf (29 pp)
- http://www.msc.uky.edu/carl/communicating_math/MCtools_page.htm
- Developed with AMSP support



Instructor's Guide to WHS (Spring 2008) by Paul Eakin and Ken Kubota

- User guide to the WHS system
- Developed as Text for course for preservice math teachers being taught in Spring 2008
  - –Problem development
  - –Posting
  - –Course management tools
  - –testing./placement system
- 106 page pdf (April 17 draft)
- Freely available at https://www.mathclass.org/WebPages/Pages/167/notes_to_26March.pdf



Algebra for Teachers 2005,2006

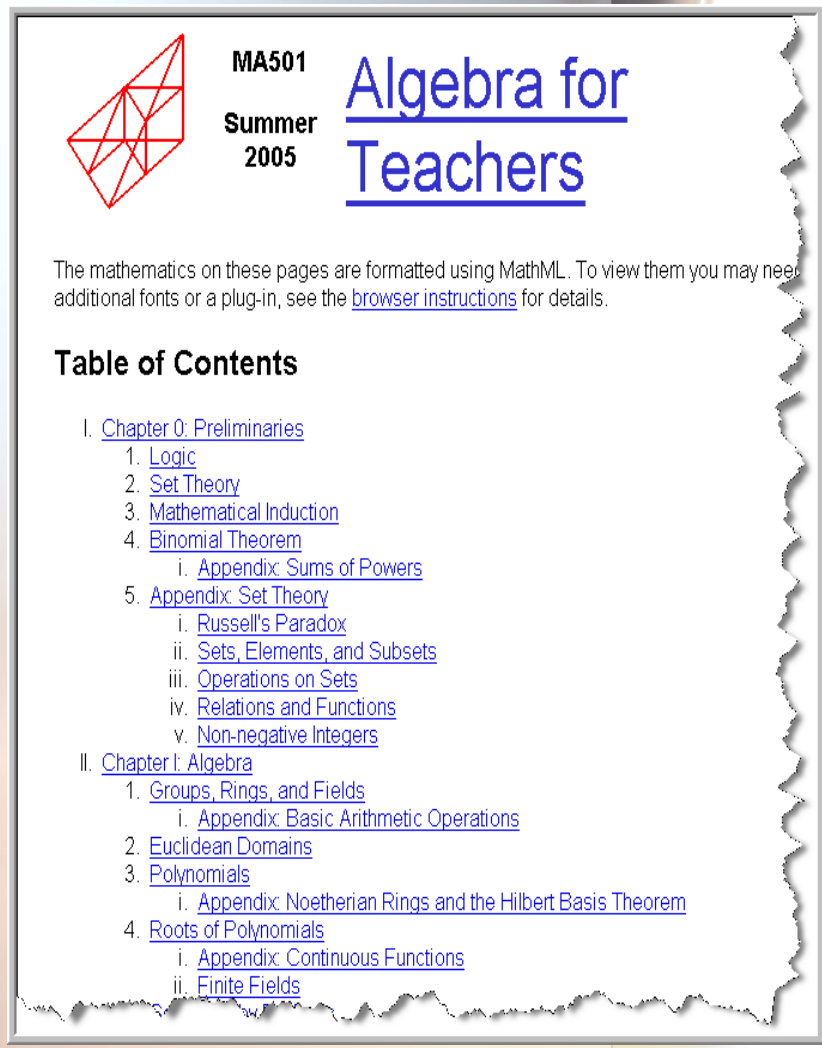
by K.K. Kubota

- A course on the material at the foundation of the mathematics taught in secondary schools

- html/mathml format

- Freely available at

http://www.msc.uky.edu/ken/ma501/text/
http://www.msc.uky.edu/ken/ma501f06/text/



MA501

Summer 2005

Algebra for Teachers

The mathematics on these pages are formatted using MathML. To view them you may need additional fonts or a plug-in, see the browser instructions for details.

Table of Contents

Publications and Presentations

- **Eakin, Paul (2008, March 28) The Kentucky State Mathematics Placement System, Presentation to the 2008 MAA Kentucky Section Meeting, Bowling Green, Kentucky**

- **Roher, L. A. H. (2008, March). *Access to algebra and professional online learning communities: Professional development for mathematics teachers in remote areas.* Presented at the Instructional Systems Design Colloquium, Department of Curriculum and Instruction, University of Kentucky, Lexington, KY.**

- **Roher, L. A. H., Stinson, S. & O'Bryan, A., (2008, March). *Creating a professional learning community for secondary mathematics teachers through embedded professional development using online meetings.* Presented at the annual Society for Information Technology and Teacher Education, Las Vegas, NV.**

- **Eakin, P., & Roher, L. A. H., (2007, October 29). *A model for embedded professional development for secondary mathematics teachers.* Presented at the 2007 Quality Teacher Summit, Frankfort, KY.**

- **Roher, L. A. H., Zehnder, S., & Kinser, G. (2007, October 19 & 20). P*rofessional learning communities communicating online in real time.* Presented at the annual meeting of the Kentucky Council of Teachers of Mathematics, Georgetown, KY.**

- Roher, L. A. H., (2007, October 15). *Embedded professional development for math teachers: College credit in college algebra for secondary school students.* Presented at the inaugural meeting of Mathematics and Science Symposium, Knoxville, TN.

- Roher, L. A. H. (2007, February 25). *Access to algebra: Comparative study of high school math students using distance learning at readiness with college algebra classroom students.* Electronic proceeding for the Tenth Special Interest Group of the Mathematical Association of America on Research in Undergraduate Mathematics Education, San Diego, CA. Available at http://cresmet.asu.edu/crume2007/papers/roher.pdf.

- Roher, L. A. H., & Aossey, C. A. (2006, September). *Centra – Online mathematics meetings.* Presented at the annual meeting of the Kentucky Council of Teachers of Mathematics, Georgetown, KY.

- Roher, L. A. H., Sathaye, A., Stinson, S. (2005). *CATSBusters Algebra I Supplement*. Lexington, KY: University of Kentucky.

Presentation Slides and Tech Reports

- Paul Eakin and K.K. Kubota, Technical Infrastructure for the Development and Support of Academic Partnerships (technical report)
  - https://www.mathclass.org/WebPages/Pages/168/tech_infrastructure.pdf
- Paul Eakin, The Placement System, (Ky MAA meeting March 28, 2007
  - https://www.mathclass.org/WebPages/Pages/168/PlacementMAA28March.pdf
- Paul Eakin and Lee Alan Roher, An Embedded Professional Development Model for Secondary Mathematics Teachers with an Alternative Approach to Dual Credit (KY Teacher Quality Summit August 2007)
  - https://www.mathclass.org/WebPages/Pages/168/DualCreditb.pdf