

A Hypertext on Linear Algebra

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Mathematical writing on the Web has largely followed the standard forms of print: papers, journals, lecture notes, encyclopedias. A hypertext is an alternative form of mathematical writing which tries to combine the wide reach and associativity of the Web with the depth and cohesion needed for learning mathematics. A hypertext on linear algebra is online and at the first stage of development. The main portion of the hypertext consists of three longer texts, which each covers a different aspect of linear algebra. These texts link to auxiliary text of different sorts: independent entries of the main theorems of linear algebra, discussions on a particular theme, supporting text on a proof or technique. We describe the structural and visual design of the text and present an online tour of the linear algebra hypertext.

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Mathematics Hypertext Project
http://alpha.fdu.edu/~mayans/mhp_home.html

Foundational paper: “The future of mathematical text”,
Journal of Digital Information, 5(1) 2004.
<http://jodi.ecs.soton.ac.uk/Articles/v05/i01/Mayans/>

Collaborators and contributors are sought for every aspect of this project.

A HYPERTEXT ON LINEAR ALGEBRA

Prototype of a large-scale system of mathematical text

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ABOUT THE PROJECT

Goal of the Mathematics Hypertext Project:

- To create large-scale integrated structures of mathematical text.

What is a hypertext?

- A collection of linked Web pages with a common structure, design, and editorial conventions.

Why a hypertext?

- A dynamic text is a natural organization for mathematics
- Advancing, improving, correcting, and reorganizing text all part of mathematical work
- Embraces the intellectual unity of mathematics as well as its diversity of subjects

Why linear algebra?

- Linear algebra holds a central position in mathematics, with strong ties to abstract algebra, functional analysis, multivariate calculus, differential equations, and with an enormous range of applications.
- Linear algebra presents both a rich area for a linked text and a serious challenge to represent a variety of viewpoints into a coherent whole.

Where is it on the Web?

- Google on "Mathematics Hypertext Project". Start at the page: "Setting up your browser".

When will it be done?

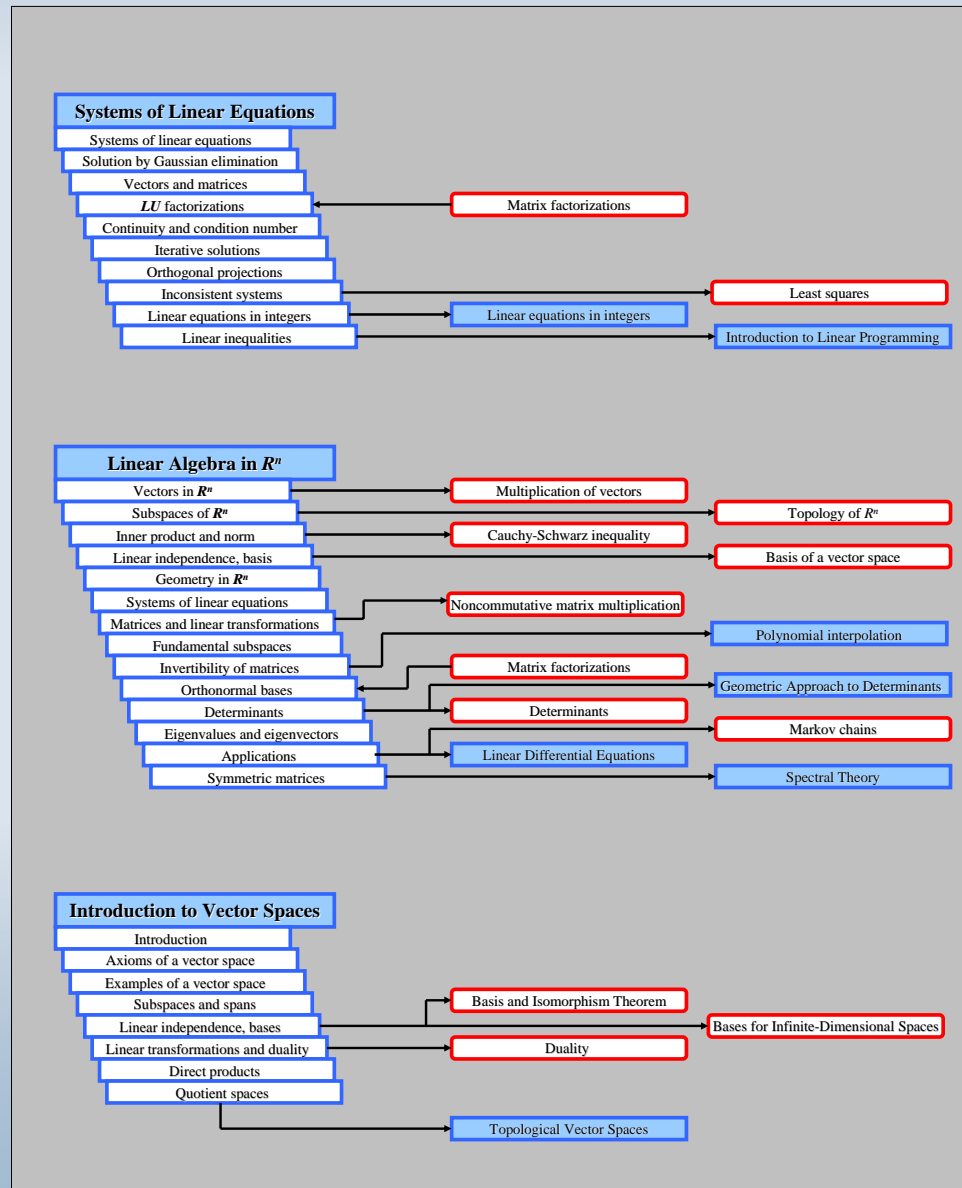
- The portion on the map will be completed by the end of 2006.

Who's working on it?

- Not enough people!
- We earnestly seek collaborators, designers, experts, students, Web whizzes, and mathematicians of every persuasion to design and develop the text.
- Contact mayans@fdlu.edu



A MAP OF THE TEXT



DESIGN PRINCIPLES

- A *primary source* for learning mathematics
- Simplest formal structure
- Editorial policy shapes the text, not formalisms
- Public tools and technology
- Sparing use of links
- Repetition preferred to disjointed text
- Modern, standard notation

PAGE AND LINK TYPES

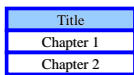
Core Text

Discussion of a single theme
Associative linking



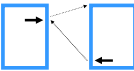
Book Text

Progression of ideas
Linear, tree-like linking



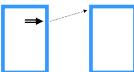
Inner Link

Returns to start point



Outer Link

No return to start point



TECHNOLOGIES

- Use of WWW standards: MathML for mathematics. SVG for graphics
- Easy, free setup for Internet Explorer and Netscape
- Use of Javascript tools, ASCIIMathML and ASCIIsvg, designed by Prof. Peter Jipsen, Chapman University
- Easy to write mathematical text.
- Example: ``e^x = 1 + x + x^2/2 + cdots`` prints as expected.

BIBLIOGRAPHY

- Paul Halmos, *Finite Dimensional Vector Spaces*
- Peter Lax, *Linear Algebra*
- David Lay, *Linear Algebra and Its Applications*
- Robert Mayans, "The future of mathematical text", *Journal of Digital Information*, 2004.