

Online Linear Algebra Tools from the MAA Course Communities

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Pepperdine University

MAA MathDL



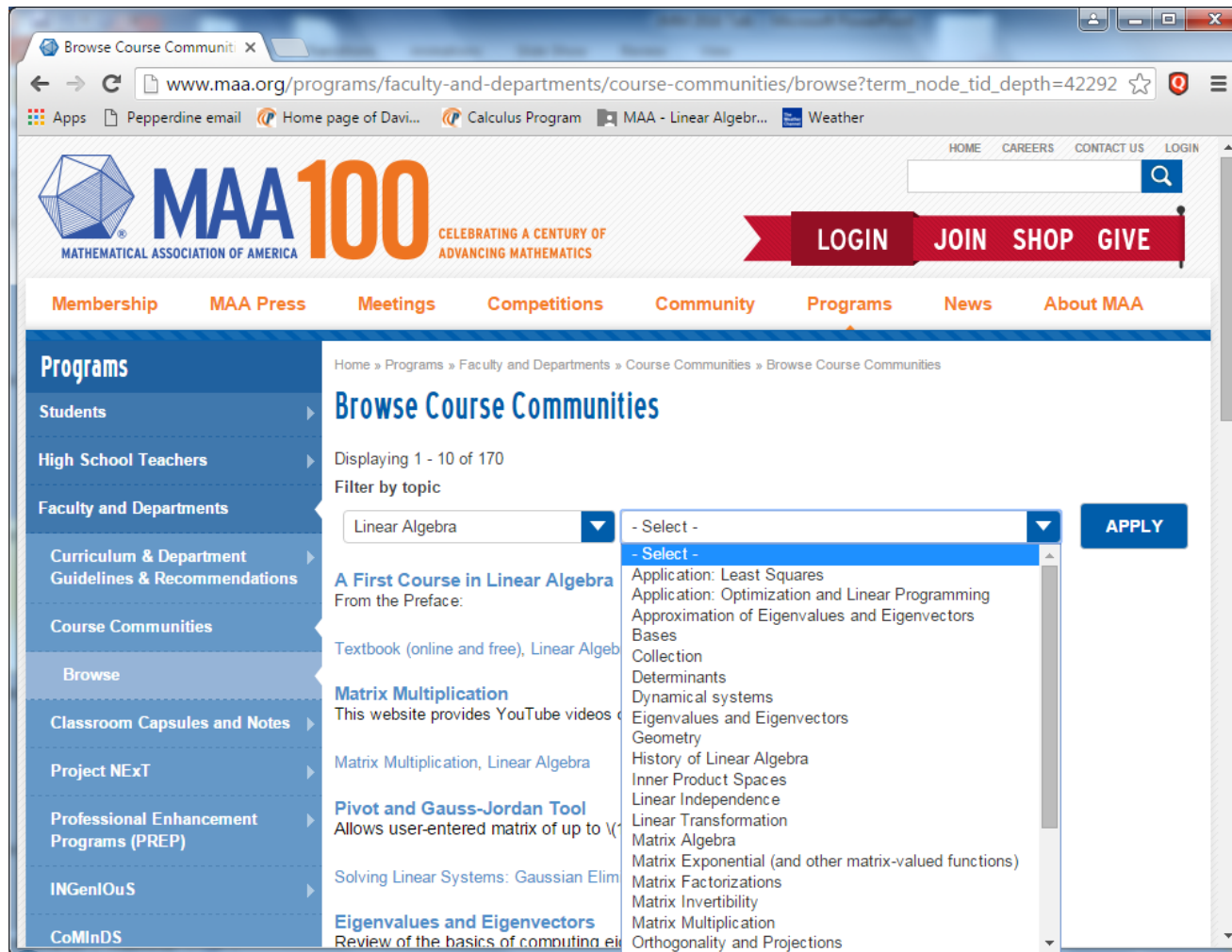
<http://www.maa.org/programs/faculty-and-departments/course-communities>

MAA MathDL Course Communities



<http://www.maa.org/programs/faculty-and-departments/course-communities>

Course Community for linear algebra



<http://www.maa.org/programs/faculty-and-departments/course-communities>

Some of the tools/resources

- Videos
- Books/tutorials
- Articles/tutorials
- Interactive tools:
 - Visualization of linear transformations
 - Gaussian elimination
 - Wolfram CDF tools
- Classroom “clicker” questions
- Past JMM linear algebra talks

Videos

The screenshot shows a web browser window displaying the MIT OpenCourseWare page for Linear Algebra video lectures. The browser's address bar shows the URL: ocw.mit.edu/courses/mathematics/18-06-linear-algebra-spring-2010/video-lectures/. The page features a dark header with the MIT OpenCourseWare logo, a newsletter subscription button, and social media links. A navigation bar includes links for Home, Courses, About, Donate, and Featured Sites, along with a search bar. The main content area is titled "Video Lectures" and includes a breadcrumb trail: Home » Courses » Mathematics » Linear Algebra » Video Lectures. A paragraph describes the video lectures as being recorded live in the Fall of 1999 by Professor Gilbert Strang. A sidebar on the left lists navigation options: COURSE HOME, SYLLABUS, CALENDAR, READINGS, ASSIGNMENTS, EXAMS, STUDY MATERIALS, and TOOLS. The main content area lists three lectures with thumbnail images: Lecture 1: The geometry of linear equations, Lecture 2: Elimination with matrices, and Lecture 3: Multiplication and inverse matrices. A "Donate Now" button is prominently displayed on the right side of the page. A yellow banner at the bottom of the page reads "Need help getting started?" and "Don't show me this again".

MIT Video Lectures | Linear Alg X

ocw.mit.edu/courses/mathematics/18-06-linear-algebra-spring-2010/video-lectures/

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Home » Courses » Mathematics » Linear Algebra » Video Lectures

Video Lectures

COURSE HOME

These video lectures of Professor Gilbert Strang teaching 18.06 were recorded live in the Fall of 1999. Support for the video production was provided by the Lord Foundation of Massachusetts under a grant to the MIT Center for Advanced Educational Services.

SYLLABUS

Subscribe to this collection

CALENDAR

READINGS

ASSIGNMENTS

EXAMS

STUDY MATERIALS

TOOLS

» Lecture 1: The geometry of linear equations

» Lecture 2: Elimination with matrices

» Lecture 3: Multiplication and inverse matrices

Donate Now

Please remember OCW in your end-of-the-year giving.

Your support makes a difference.

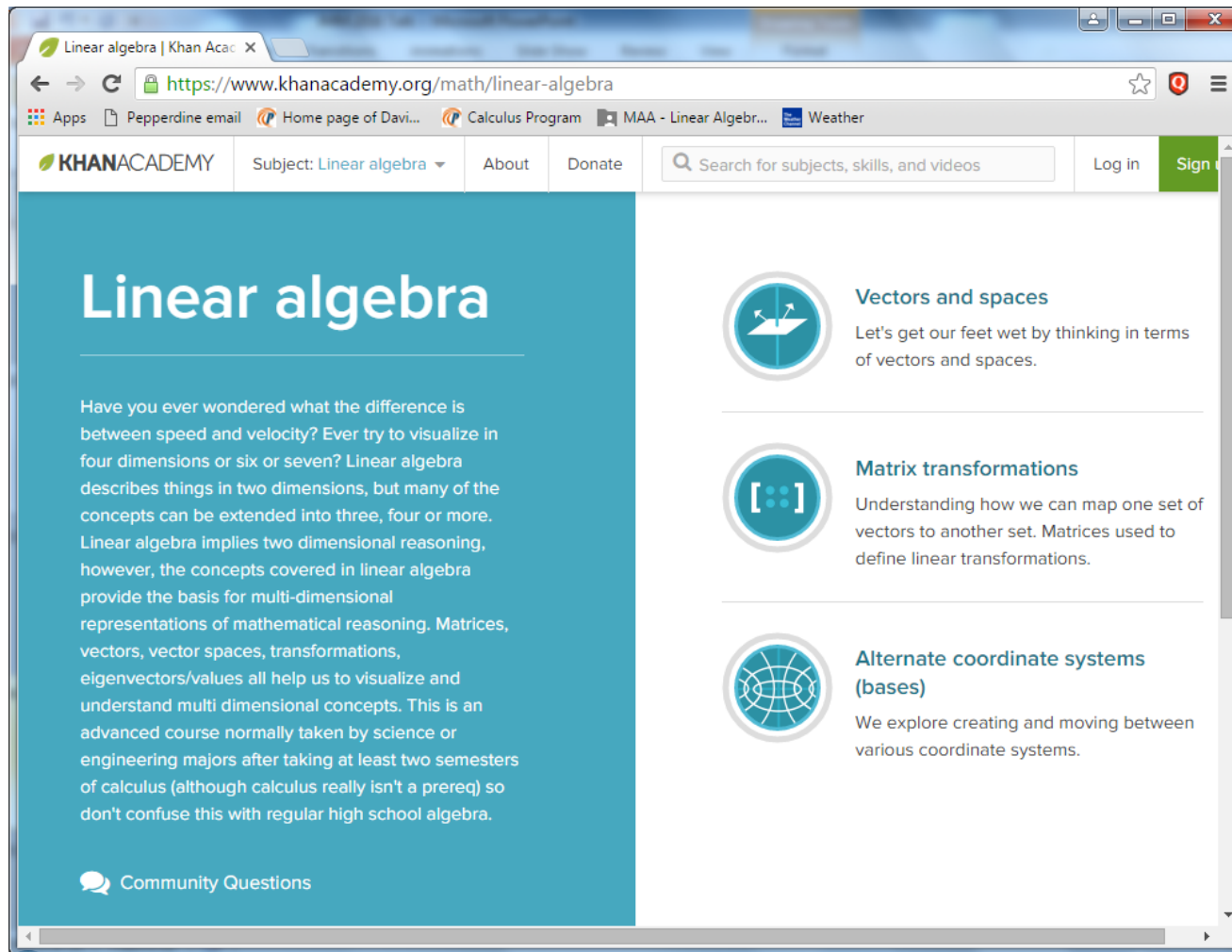
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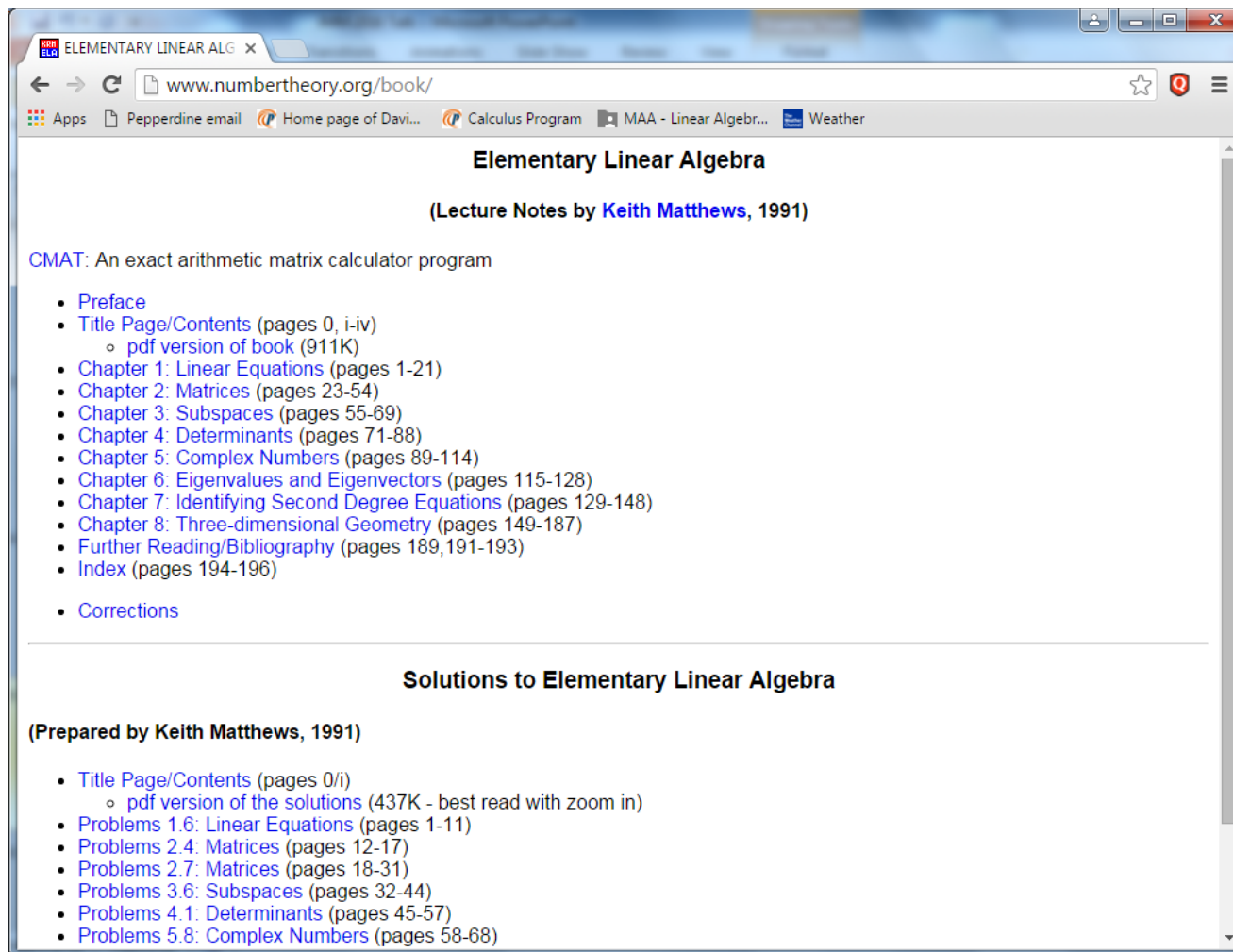
<http://ocw.mit.edu/courses/mathematics/18-06-linear-algebra-spring-2010/video-lectures/>

Videos



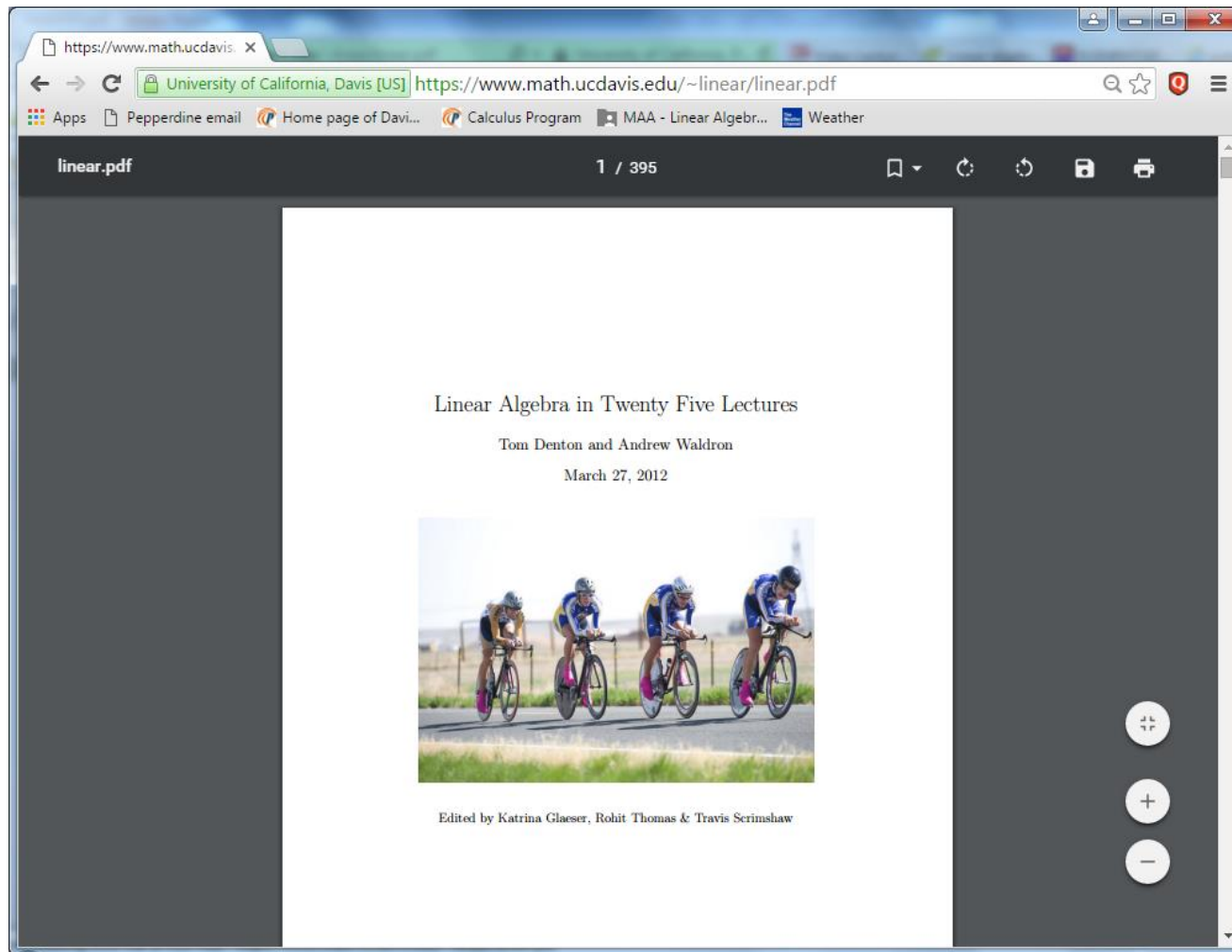
<https://www.khanacademy.org/math/linear-algebra>

Books/tutorials



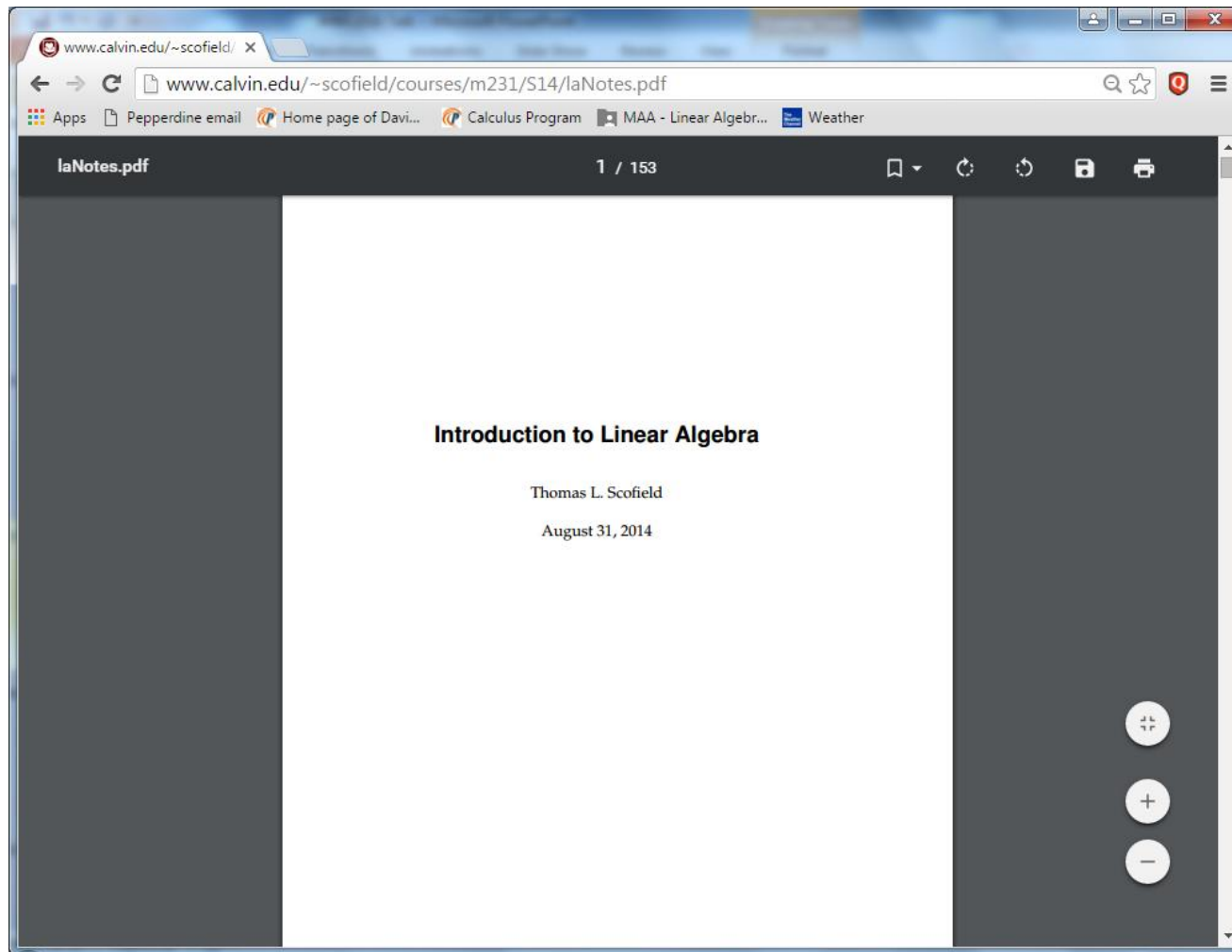
<http://www.numbertheory.org/book/>

Books/tutorials



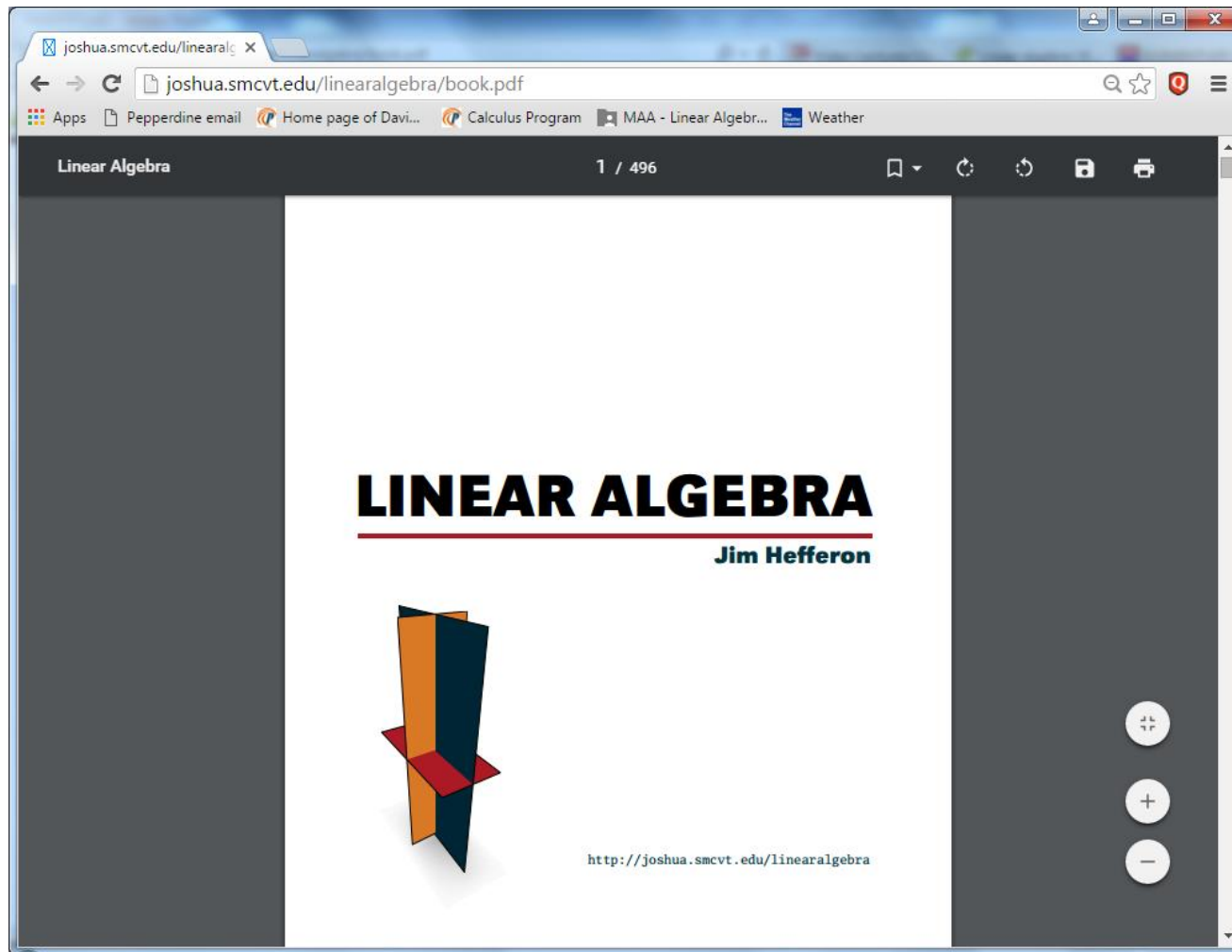
<https://www.math.ucdavis.edu/~linear/linear.pdf>

Books/tutorials



<http://www.calvin.edu/~scofield/courses/m231/S14/laNotes.pdf>

Books/tutorials



<http://joshua.smcvt.edu/linearalgebra/book.pdf>

Articles/tutorials

The screenshot shows a web browser window displaying the JSTOR website. The address bar shows the URL www.jstor.org/stable/i326560. The page features the MAA logo and navigation links. A search bar is present with the text "In This Issue". The main content area displays the journal title "The College Mathematics Journal" and the issue information "Vol. 24, No. 1, Jan., 1993". A cover image of the journal is shown. Below the cover, there are links for "Submission Guidelines", "Journal Home Page", and "Subscription Information". A "Table of Contents" section is visible, with a "Select / Unselect all" checkbox and an "Export Selected Citations" button. The "Front Matter" (pp. 1-2) is listed with its Stable URL: <http://www.jstor.org/stable/2686425>. A login prompt on the right side of the page states "You are not currently logged in." and provides a "Login" button.

Vol. 24, No. 1, Jan., 1993

[www.jstor.org/stable/i326560](#)

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MAA
MATHEMATICAL ASSOCIATION OF AMERICA

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[Login](#)

The College Mathematics Journal > Vol. 24, No. 1, Jan., 1993

The College Mathematics Journal

Vol. 24, No. 1, Jan., 1993

Published by: [Mathematical Association of America](#)
Stable URL: <http://www.jstor.org/stable/i326560>

[Submission Guidelines](#)
[Journal Home Page](#)
[Subscription Information](#)

Journal Info

Table of Contents

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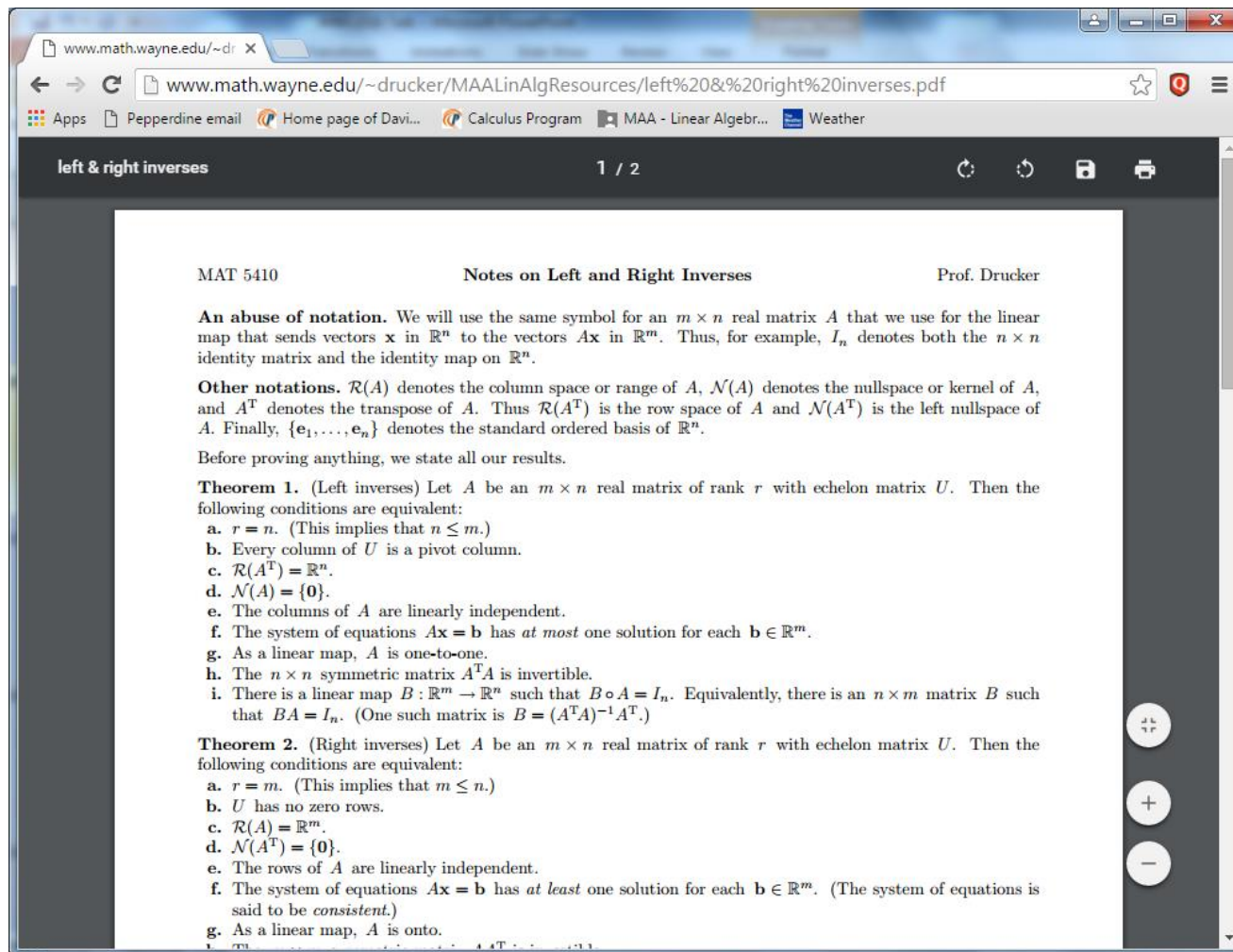
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[Export Selected Citations](#)

☐ [Front Matter](#) (pp. 1-2)
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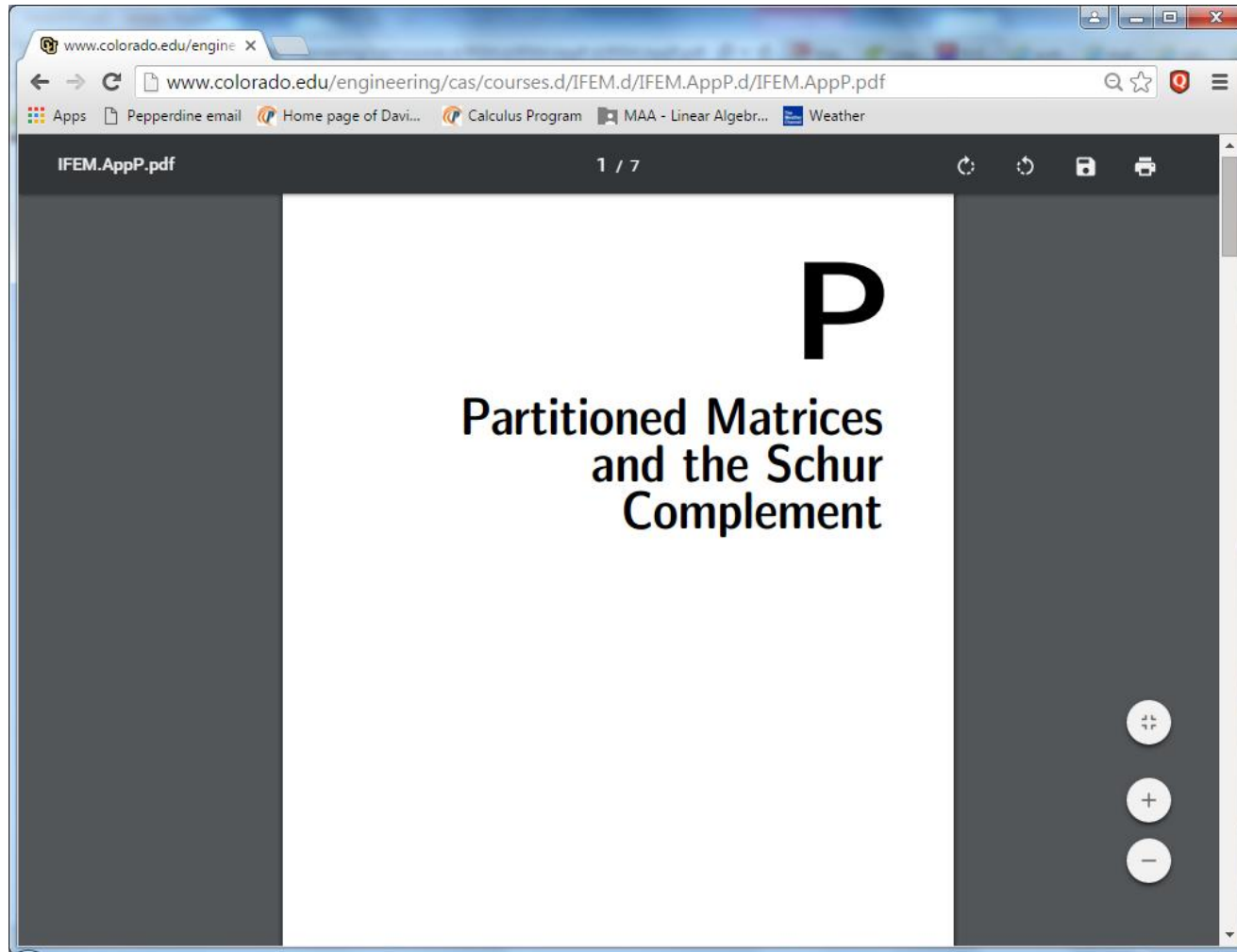
<http://www.jstor.org/stable/i326560>

Articles/tutorials



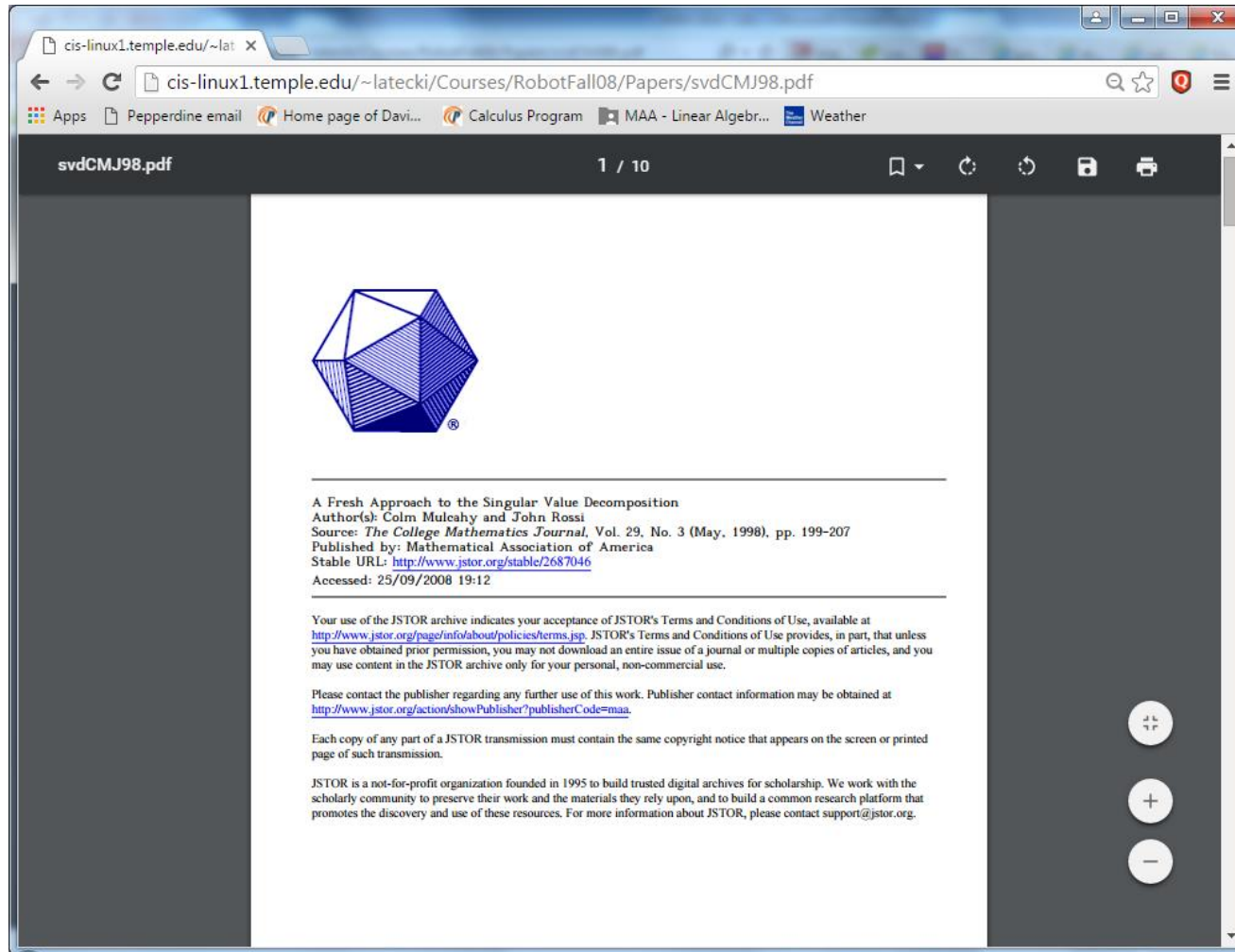
<http://www.math.wayne.edu/~drucker/MAALinAlgResources/left%20&%20right%20inverses.pdf>

Articles/tutorials



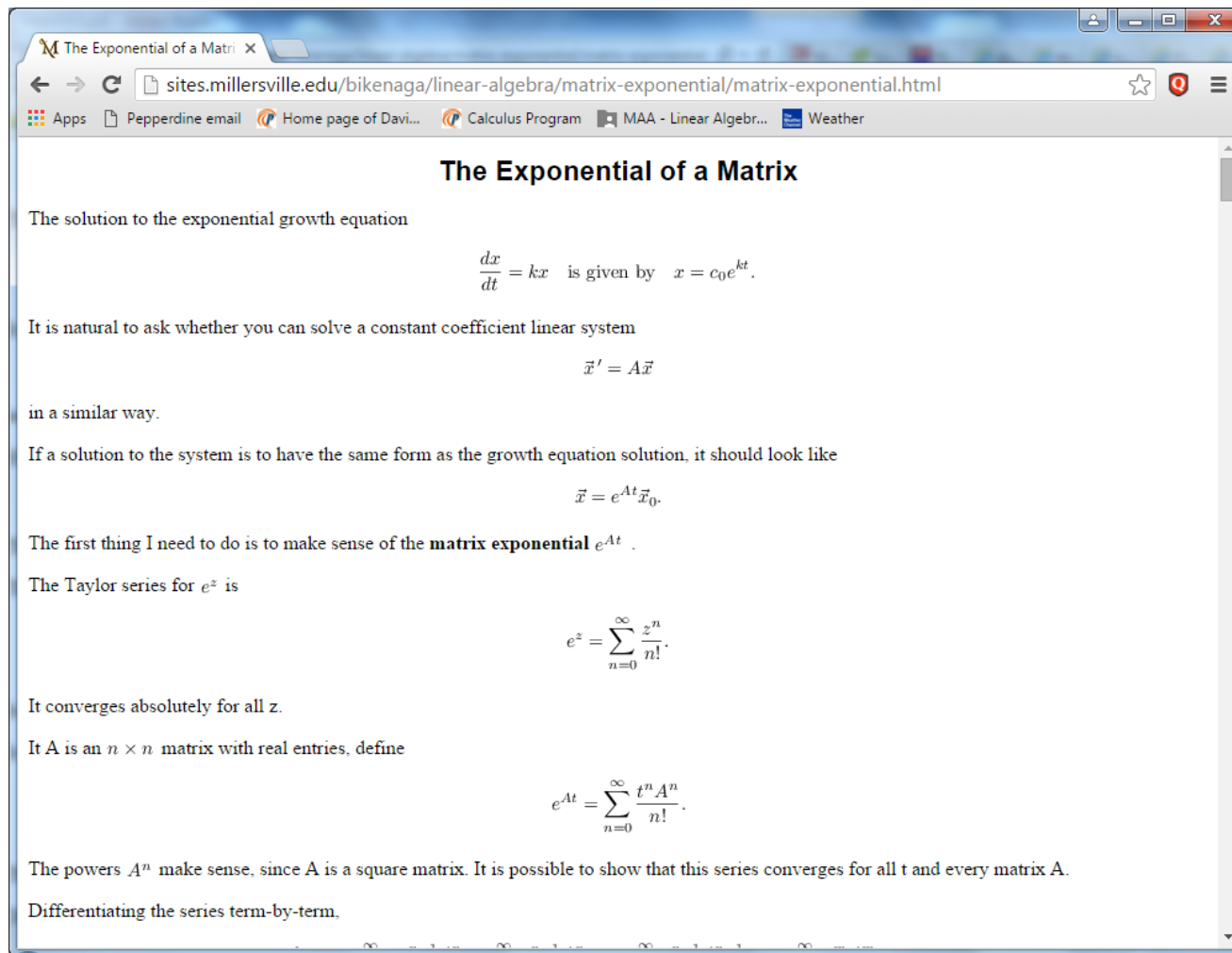
<http://www.colorado.edu/engineering/cas/courses.d/IFEM.d/IFEM.AppP.d/IFEM.AppP.pdf>

Articles/tutorials



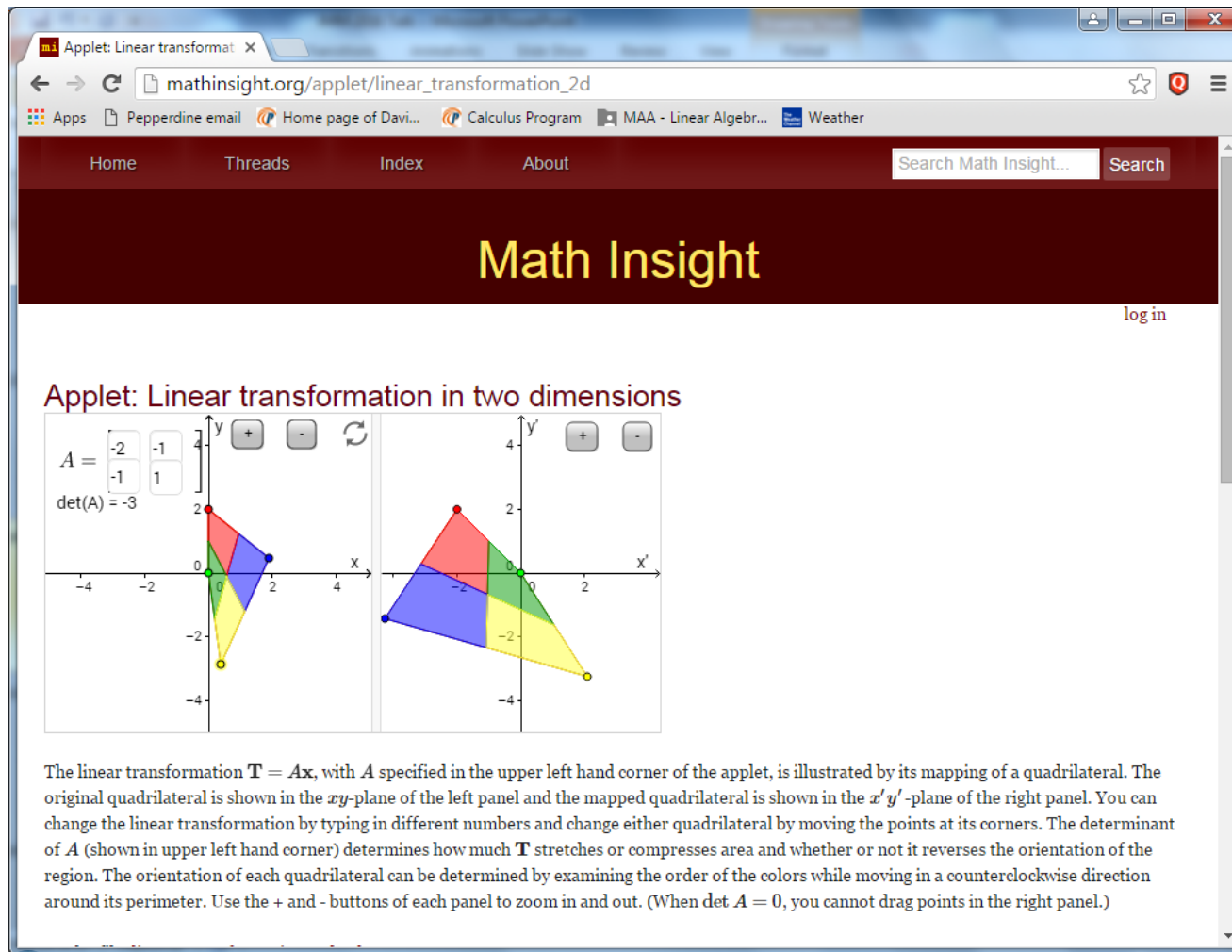
<http://cis-linux1.temple.edu/~latecki/Courses/RobotFall08/Papers/svdCMJ98.pdf>

Articles/tutorials



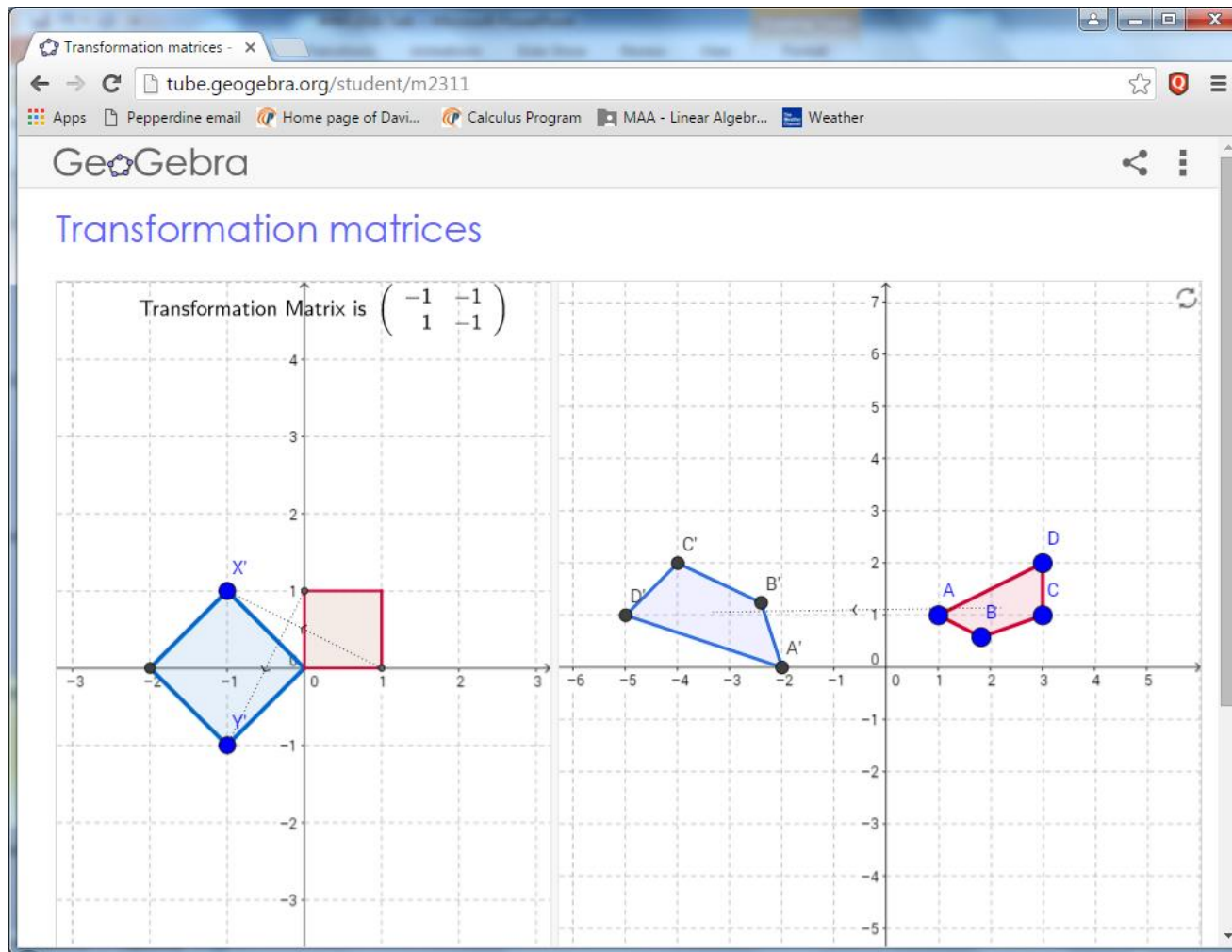
<http://sites.millersville.edu/bikenaga/linear-algebra/matrix-exponential/matrix-exponential.html>

Linear transformations



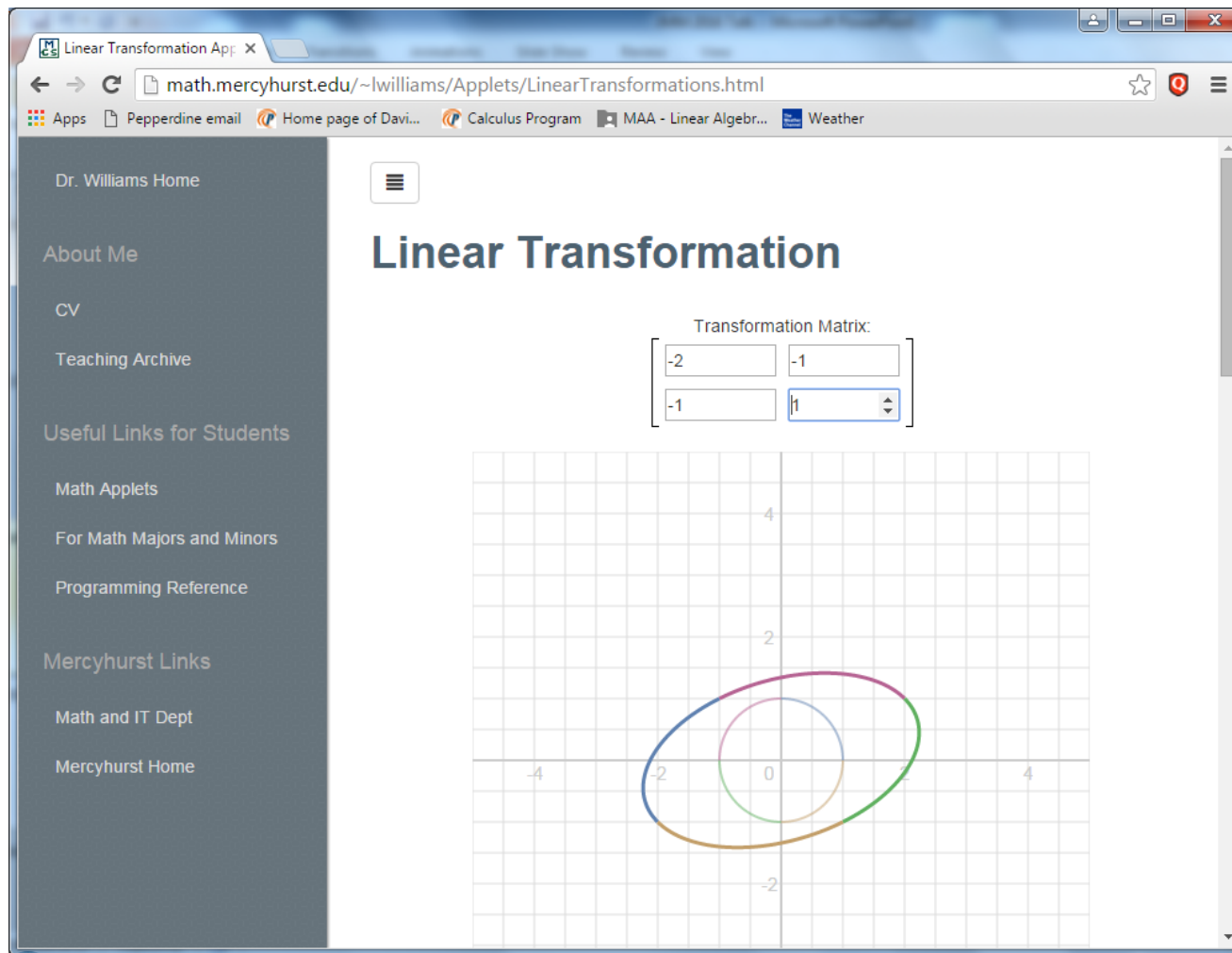
http://mathinsight.org/applet/linear_transformation_2d

Linear transformations



<http://tube.geogebra.org/student/m2311>

Linear transformations



<http://math.mercyhurst.edu/~lwilliams/Applets/LinearTransformations.html>

Other experimentation/visualization

The screenshot shows the Math Insight website in a web browser. The browser's address bar displays mathinsight.org. The website has a dark red header with navigation links: Home, Threads, Index, and About. A search bar is located on the right side of the header. Below the header, the site title "Math Insight" is prominently displayed in yellow. A secondary navigation bar contains links: Top, Highlighted pages, Recent news, Recent pages, Highlighted applets, and Welcome. A "log in" link is positioned on the right side of this bar.

The main content area is divided into three columns:

- Highlighted pages:** This section features two entries. The first is "Introduction to differentiability in higher dimensions", described as an introduction to the basic concept of the differentiability of a function of multiple variables, with discussion centers around the existence of a tangent plane to a function of two variables. The second entry is "An introduction to parametrized curves", described as an introduction to how a vector-valued function of a
- Recent news:** This section contains two news items. The first states, "Redesigned for small screens by Duane Q. Nykamp on May 31, 2012". The second states, "We've redesigned the Math Insight web site to optimize its appearance on small screens, such as those of mobile devices." Below this, another entry reads, "Interactive Gallery of Quadric Surfaces by Duane Q. Nykamp on March 14, 2012". The final entry states, "We've added the Interactive Gallery of Quadric Surfaces".
- Highlighted applets:** This section features two interactive visualizations. The first is titled "Applet: Particle on helix with magnet and tangent vector" and includes the text: "Illustration of magnetic bead moving along a helix with tangent vector and vector corresponding to a magnetic field." It shows a 3D plot of a helix with a blue curve, a green plane, and a red dot representing a particle. The second is titled "Applet: A three-dimensional linear transformation that reverses orientation" and includes the text: "Illustration of a linear transformation mapping the unit cube to a parallelepiped while reversing orientation." It shows a 3D plot of a unit cube being transformed into a parallelepiped.

<http://mathinsight.org/>

Other experimentation/visualization

The screenshot displays the GeoGebra website interface. At the top, the browser address bar shows tube.geogebra.org. The website header includes the GeoGebra logo, navigation links for Materials, Downloads, Community, and Help, and a Sign in button. Below the header is a search bar with the text "Search our 319270 Free and Interactive Materials" and an "Upload Material" button. The main content area is divided into three sections: "Featured Materials", "Newest Materials", and "Popular Worksheets".

Featured Materials:

- My World My Math!** by Stephen Jull (Image of a woman)
- Involute profile** by Xabier Iriarte (Diagram of a curve)
- Moss Egg by Robert Dixon** by Bill Lombard (Diagram of a circle with points)
- Growth of Facebook.com** by Roy Wright (Graph showing growth over time)
- Inclined Plan Two Mas...** by ukukuku (Diagram of an inclined plane)

Newest Materials:

- Menentukan Luas Belah** by Kurniawan (January 2, 2016 - 7:29 PM)

Popular Worksheets:

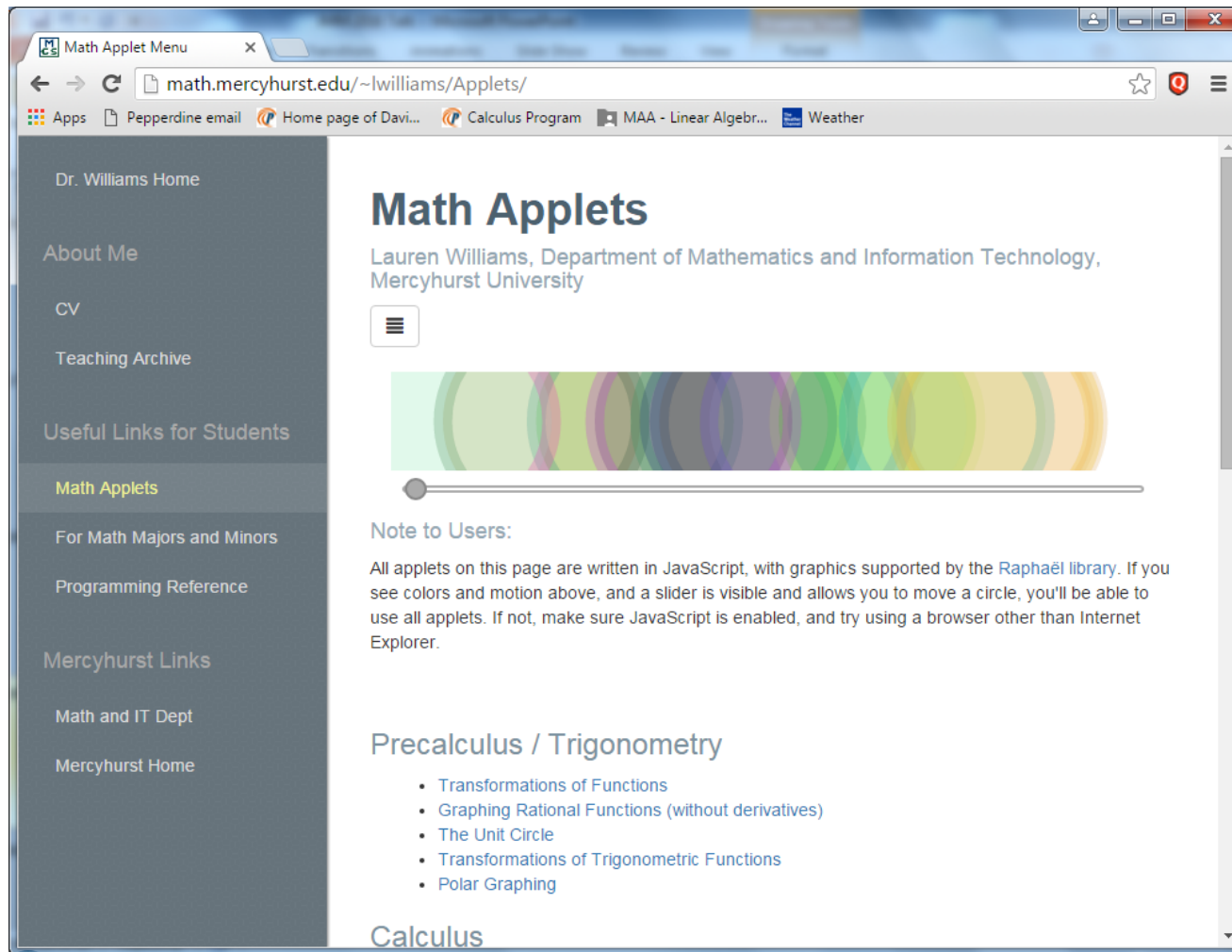
- Angle at the centre Theo** by laura.rees-hughes (October 22, 2011 - 11:47 PM)

Popular Tags:

- geometry, equations, algebra, linear, area, quadratic, tessellation, graph, of, functions, angle, function, circle, angles

<http://tube.geogebra.org/>

Other experimentation/visualization



<http://math.mercyhurst.edu/~lwilliams/Applets/>

Gaussian elimination

Gauss-Jordan Elimination Calculator

- Enter the dimension of the matrix. (Rows x Columns).
- Maximum matrix dimension for this system is 9x9.
- Result will be rounded to 3 decimal places.
- Identity matrix will only be automatically appended to the right side of your matrix if the resulting matrix size is less or equal than 9x9

3 x 4 ☐ Automatically append the Identity Matrix **Show Matrix**

Enter the matrix entries in the boxes below:

1	2	3	-1
4	5	6	0
7	8	9	1

Perform Gauss-Jordan elimination

$$\begin{bmatrix} 1 & 2 & 3 & -1 \\ 4 & 5 & 6 & 0 \\ 7 & 8 & 9 & 1 \end{bmatrix}$$

Step 1: Swap row 3 and 1

$$\begin{bmatrix} 7 & 8 & 9 & 1 \\ 4 & 5 & 6 & 0 \\ 1 & 2 & 3 & -1 \end{bmatrix}$$

Step 2: Divide row 1 by 7

$$\begin{bmatrix} 1 & 1.143 & 1.286 & 0.143 \\ 4 & 5 & 6 & 0 \\ 1 & 2 & 3 & -1 \end{bmatrix}$$

Online Tools

- Question of the month (Sep 2012)
- Fun Ways to Teach Your Kids Mathematics
- Question of the week (7 Dec 2011)
- Math problem from the past
- Birthday Paradox

Online Tools

- Worksheet Generator
- Problem Sums Worksheet Generator

Online Tools

- GCD and LCM
- Geometric Linear Transformation (2D)
- Geometric Linear Transformation (3D)
- Matrix
- Gauss-Jordan Elimination
- Permutations and Combinations
- Prime Factorization
- Quadratic Equations
- Significant Figures
- Simultaneous Linear Equations

Select Language **Translate**

Powered by **Translate**

http://www.idomaths.com/gauss_jordan.php

Gaussian elimination

Row Echelon Form

www.math4all.in/public_html/linear%20algebra/RowEchelonForm/index.html

Apps | Pepperdine email | Home page of Davi... | Calculus Program | MAA - Linear Algebr... | Weather

Applet 2.5 : Row Echelon Form

Matrix Entry :						Row Operation Log :
Row1 :	<input type="text" value="1"/>	<input type="text" value="2"/>	<input type="text" value="3"/>	<input type="text" value="-1"/>	<input type="text"/>	
Row2 :	<input type="text" value="4"/>	<input type="text" value="5"/>	<input type="text" value="6"/>	<input type="text" value="0"/>	<input type="text"/>	
Row3 :	<input type="text" value="7"/>	<input type="text" value="8"/>	<input type="text" value="9"/>	<input type="text" value="1"/>	<input type="text"/>	
Row4 :	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	
Row5 :	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	
Row6 :	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	

Elementary Row Operations :

Scale row by

Exchange row and

Add times row to row

⌵

http://www.math4all.in/public_html/linear%20algebra/RowEchelonForm/index.html

Gaussian elimination

The screenshot shows a web browser window with the address bar displaying `matrix.reshish.com/gaussSolution.php`. The page has a dark theme and a sidebar on the left with buttons for 'Inverse Matrix', 'Matrix Power', 'Matrix Transpose', 'Matrix Multiplication', and 'Matrix Addition/Subtraction'. The main content area shows the steps of Gaussian elimination for a 3x5 matrix.

Your matrix

No	X_1	X_2	X_3	b
1	1	2	3	1
2	4	5	6	0
3	7	8	9	-1

Find the pivot in the 1st column in the 1st row

No	X_1	X_2	X_3	b
1	1	2	3	1
2	4	5	6	0
3	7	8	9	-1

Multiply the 1st row by 4

No	X_1	X_2	X_3	b
1	4	8	12	4
2	4	5	6	0
3	7	8	9	-1

<http://matrix.reshish.com/>

Gaussian elimination

The screenshot shows a web browser window with the address `www.dangries.com/Flash/RowReducer/RowReducer.html`. The browser's address bar and tabs are visible. The main content area is titled "Row Operations" and contains three sections for performing row operations on a matrix. Each section has a "go" button.

Row Operations

- I** Swap rows and **go**
- II** Multiply row by **go**
- III** Add times row to row **go**

Below the operations are three buttons:

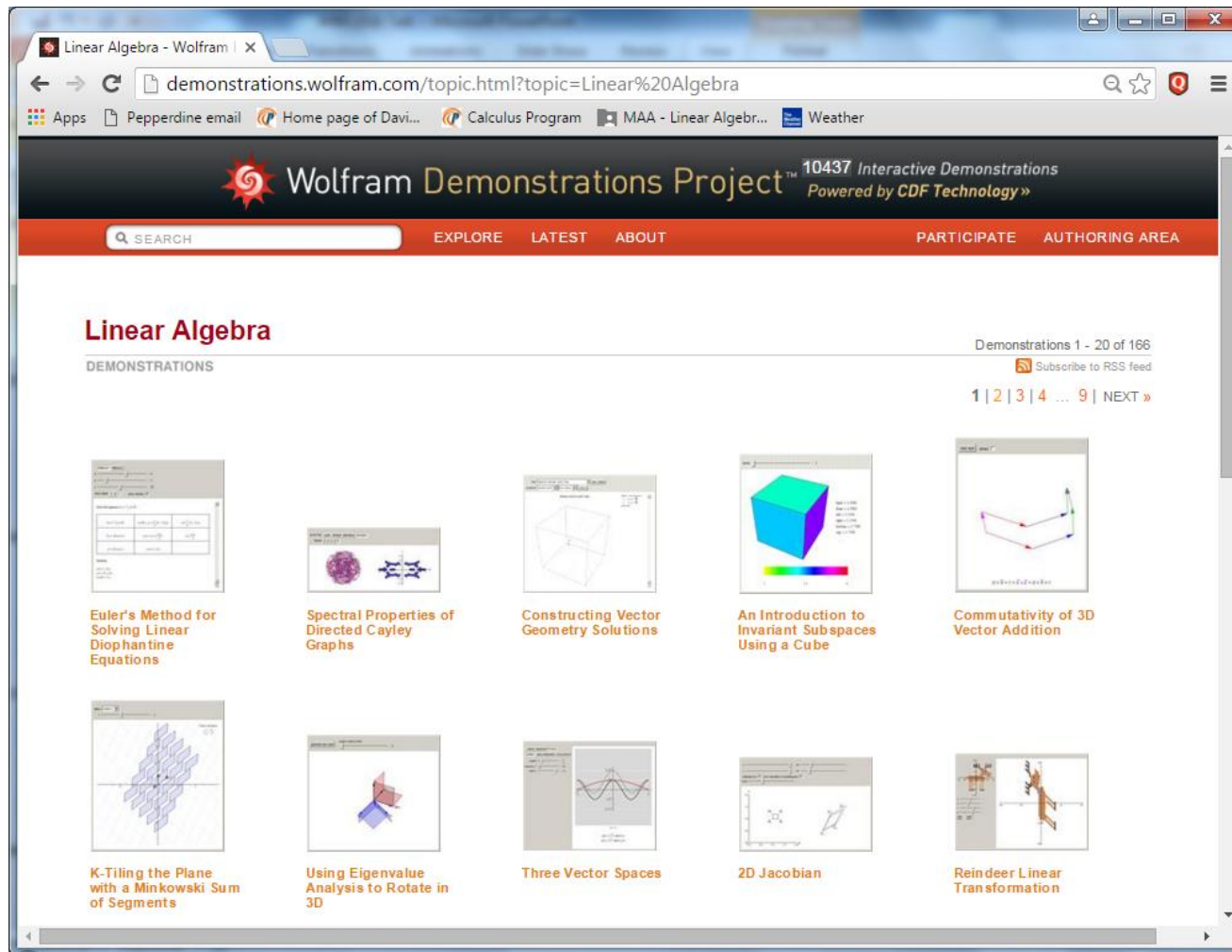
- start over with original matrix
- start over with a new matrix
- show printable output

The matrix being manipulated is displayed in a table:

1	2	3	1
4	5	6	0
7	8	9	-1

<http://www.dangries.com/Flash/RowReducer/RowReducer.html>

Wolfram CDF activities

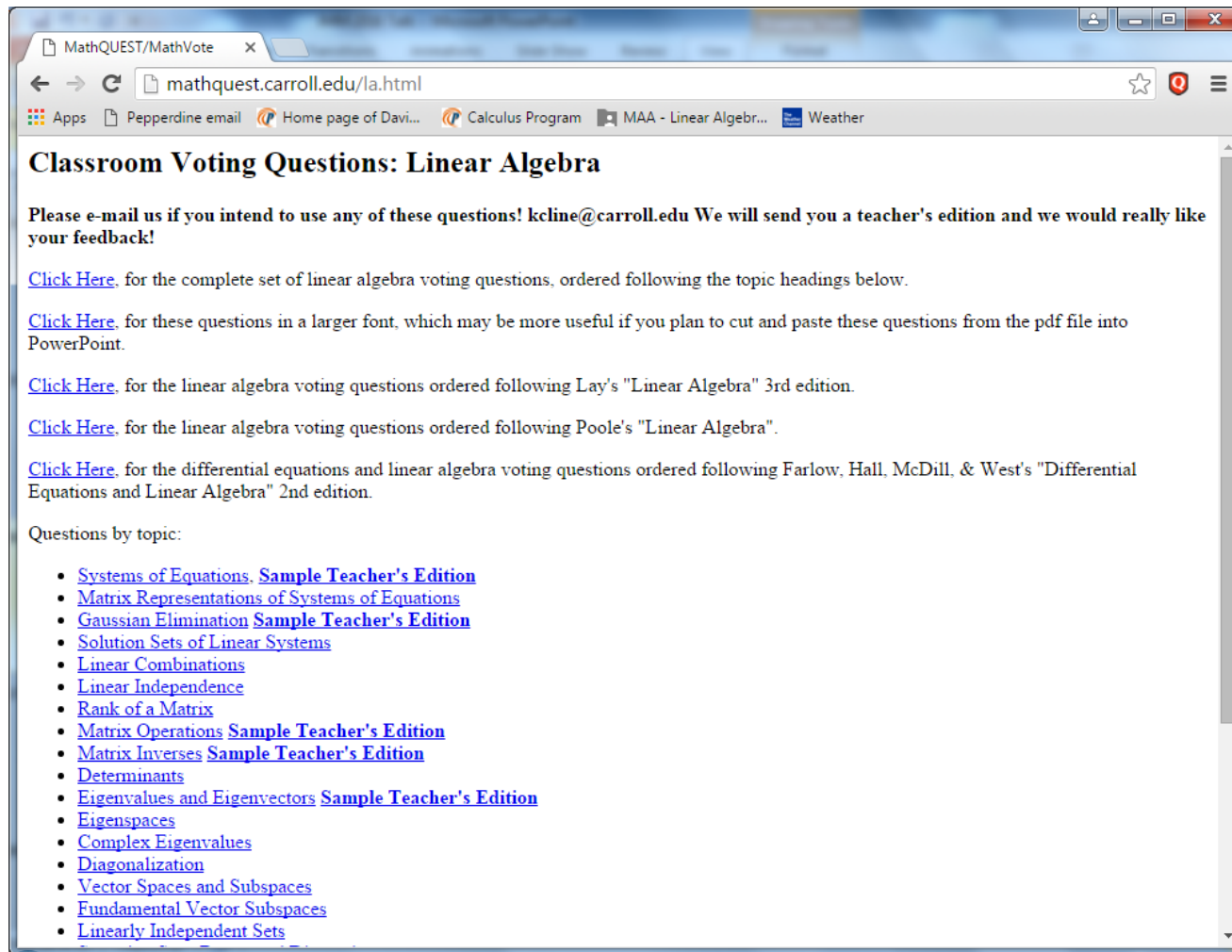


<http://demonstrations.wolfram.com/topic.html?topic=Linear%20Algebra>

Other technology

- Mathematica
- Matlab
- Maple
- Excel

Classroom “clicker” questions



MathQUEST/MathVote

mathquest.carroll.edu/la.html

Apps | Pepperdine email | Home page of Davi... | Calculus Program | MAA - Linear Algebr... | Weather

Classroom Voting Questions: Linear Algebra

Please e-mail us if you intend to use any of these questions! kcline@carroll.edu We will send you a teacher's edition and we would really like your feedback!

[Click Here](#), for the complete set of linear algebra voting questions, ordered following the topic headings below.

[Click Here](#), for these questions in a larger font, which may be more useful if you plan to cut and paste these questions from the pdf file into PowerPoint.

[Click Here](#), for the linear algebra voting questions ordered following Lay's "Linear Algebra" 3rd edition.

[Click Here](#), for the linear algebra voting questions ordered following Poole's "Linear Algebra".

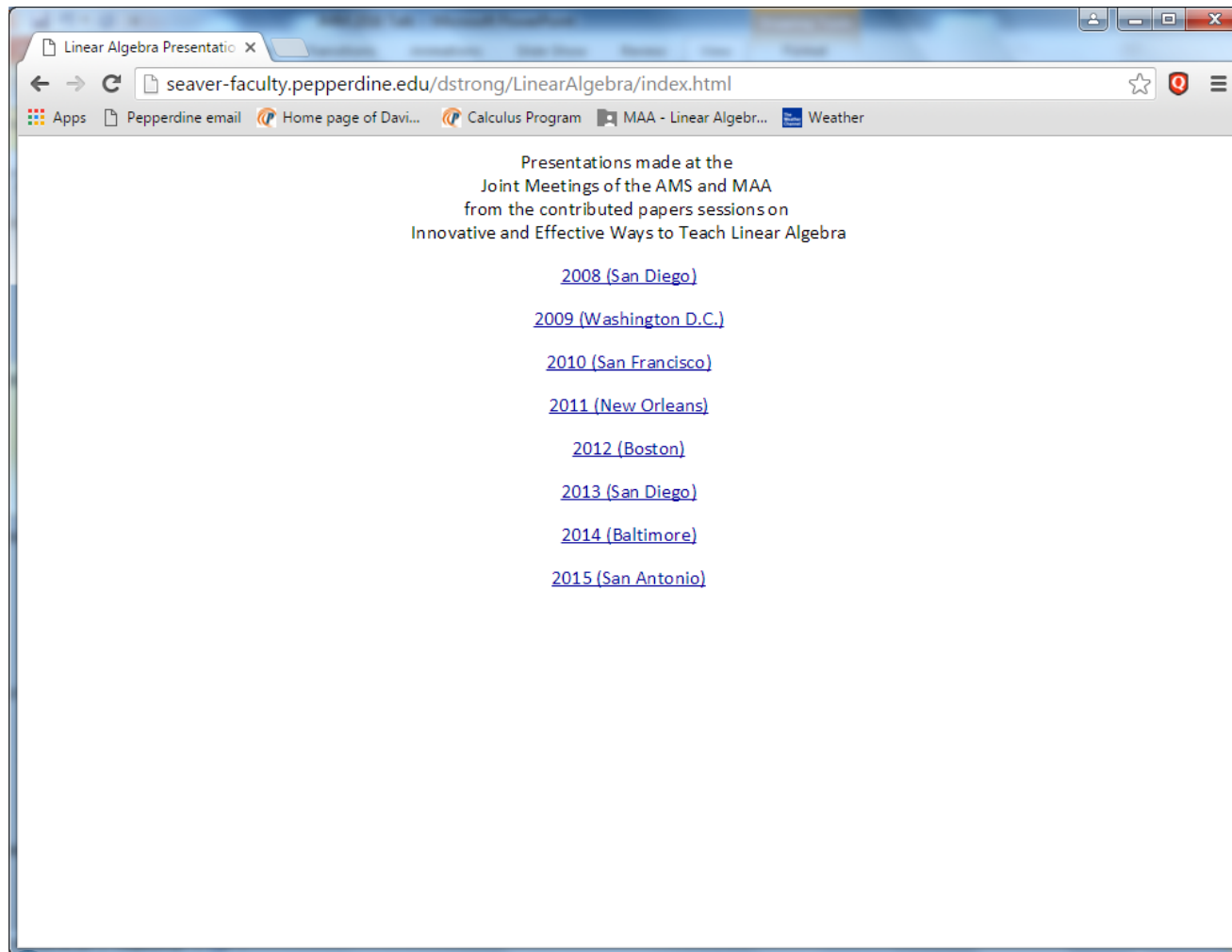
[Click Here](#), for the differential equations and linear algebra voting questions ordered following Farlow, Hall, McDill, & West's "Differential Equations and Linear Algebra" 2nd edition.

Questions by topic:

- [Systems of Equations](#) **Sample Teacher's Edition**
- [Matrix Representations of Systems of Equations](#)
- [Gaussian Elimination](#) **Sample Teacher's Edition**
- [Solution Sets of Linear Systems](#)
- [Linear Combinations](#)
- [Linear Independence](#)
- [Rank of a Matrix](#)
- [Matrix Operations](#) **Sample Teacher's Edition**
- [Matrix Inverses](#) **Sample Teacher's Edition**
- [Determinants](#)
- [Eigenvalues and Eigenvectors](#) **Sample Teacher's Edition**
- [Eigenspaces](#)
- [Complex Eigenvalues](#)
- [Diagonalization](#)
- [Vector Spaces and Subspaces](#)
- [Fundamental Vector Subspaces](#)
- [Linearly Independent Sets](#)

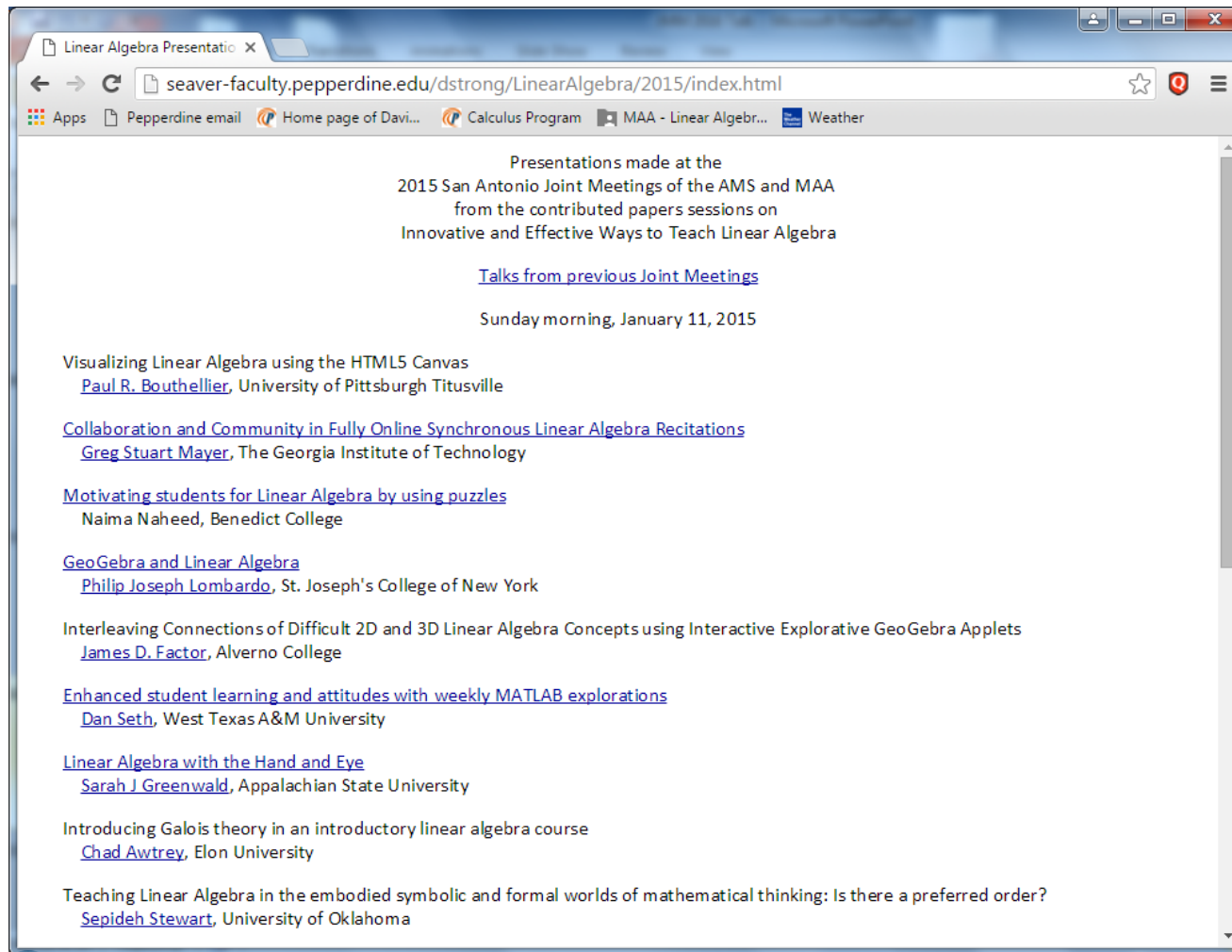
<http://mathquest.carroll.edu/la.html>

Past JMM linear algebra talks



<http://seaver-faculty.pepperdine.edu/dstrong/LinearAlgebra/index.html>

Past JMM linear algebra talks



<http://seaver-faculty.pepperdine.edu/dstrong/LinearAlgebra/index.html>

More work needed

- There are all sorts of tools and resources online. Some are good, some are not.
- A more extensive survey of online is needed. This compilation/collection of tools could be sorted by topic, format, helpfulness/quality, etc., similar to sorting through restaurants on Yelp.

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Questions?