

Goodσελλ Gazette

Carleton College
Northfield MN 55057

The newsletter for the Carleton mathematics and statistics community

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SMART Scholarship Program

The Science, Mathematics And Research for Transformation (SMART) Scholarship for Service Program is an opportunity for students pursuing an undergraduate or graduate degree in science, technology, engineering, and mathematics (STEM) disciplines. Successful applicants receive a full scholarship and are employed upon degree completion at a Department of Defense (DoD) research facility. Scholarships awarded include a cash award of \$25,000 to \$41,000 a year, full tuition, required fees, health insurance allowance, and book allowance. The SMART Program allows individuals to acquire an education in exchange for a period of employment with the DoD. The program is intended for U.S. citizens; students must be at least 18 years of age to be eligible for an award. The application deadline is December 1, 2011. See detailed information on the program and how to apply at <http://smart.asee.org/>.

Symmetry in Math

Frank Farris, Benedict Distinguished Visiting Professor of Mathematics, will be giving a talk on Wednesday, November 9 about visual representation in mathematics.

Seeing Mathematics from 7-8 PM in the Gould Library Athenaeum:

When it comes to communicating mathematical thoughts, the eyes have it over the ears. Drawing diagrams to supplement proofs is as old as Euclid, but advances in computer graphics make the argument even stronger: For teaching mathemat-

ical ideas, the right picture is better than any number of words, especially when our ability to distinguish colors gets involved. We offer images that teach concepts of geometry, simple and complex, highlighting the rich and varied concept of symmetry.

Introducing MathTube

Mathtube.org, a new multimedia resource hosted by the Pacific Institute for the Mathematical Sciences, includes lectures from a wide range of areas of the mathematical sciences, video notes, slides, and lectures from the PIMS IGTC in Mathematical Biology and the Collaborative Research Groups (CRG). Videos also come from education conferences such as "Changing the Culture," which explores topics in mathematics education. Learn more at <http://www.mathtube.org/>.

Job and Fellowship Opportunities with the U.S. Census Bureau

The U.S. Census Bureau has several job opportunities in the Washington, DC area for candidates with mathematics and statistics courses from a variety of majors. We have opportunities for short-term and long-term employment for students interested in applying their academic coursework to a challenging and engaging work environment.

At the Census Bureau, mathematical statisticians work on topics such as sample design for surveys and censuses, quality control programs, record linkage, coverage measurement, variance

estimation, data analysis, statistical modeling, and many other math related areas.

You can visit www.census.gov/hrd/www/ for more information.

PROBLEMS OF THE WEEK

1. a) Show that for any positive integer n , $\tan(nx)$ can be expressed as $f(\tan x)$, where f is some rational function (quotient of polynomials).
 b) Specifically, suppose that

$\tan(2011x) = \frac{P(\tan x)}{Q(\tan x)}$, where P and Q are polynomials with no common factor. Find the degrees of the polynomials P and Q .

2. a) Do there exist 2×2 matrices A and B with real entries such that $ABA = O$ and $BAB = O$ but neither AB nor BA is equal to O ? If so, give an example; if not, show why not. (O denotes the matrix all of whose entries are zero.)

b) As part a), but with all 2×2 matrices replaced by 3×3 matrices.

More solutions from (not as) far: Solutions to last week's problems, using technology, arrived from John Snyder in Oconomowoc, WI. There was word of some work on them on campus, as well, but so far no actual solutions have appeared. Maybe this weekend?

- Mark Krusemeyer [Type equation here.](#)

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| Editors: | Max Bearak Stephen Kennedy |
| Problems of the Week: | Mark Krusemeyer |
| Subscriptions & Web: | Sue Jandro |