

# Math Mess

Department of Mathematics  
St. Olaf College  
Northfield, MN 55057

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## **This Week's Mathematics Colloquium**

Title: Zillij: The Aesthetic, Artistic, Geometric Odyssey of the Field Supervised Course of the Term in the Middle East 2001-2002

Speaker: Rich Allen

Time: Thursday, May 2<sup>nd</sup>, 2 pm

Place: SC 282

### **This Week's Colloquium**

Rich Allen is a member of our illustrious St. Olaf math department. A native New Englander, Dr. Allen graduated from Boston College and received his Ph.D. from Indiana University. He and his wife Wendy Allen, a professor in the Romance Language department, led the Term in the Middle East Program this last fall.

This colloquium presentation will start with an overview of the Field Supervisors' course for the Term in the Middle East 2001-2002. The presentation will give special attention to the geometric patterns and images that permeate Islamic culture. We will look at some of the patterns, then discuss the basic circle geometry underlying these patterns and indicate why some geometric figures are important to Islamic culture. We will finish by showing the original patterns created by the students studying in the program.

### **Career Column**

Career of the Week: Mathematics Teacher

Have you considered a career as a junior high or high school mathematics teacher? The report of The National Commission on Mathematics and Science Teaching for the 21st Century recommended significantly increasing the number of mathematics teachers and improving the quality of their preparation. As the need for math teachers has grown, schools have assigned teachers trained in other areas to teach math. Currently in the U.S. about 86% of grades 9-12 math teachers and 66% of grades 7-8 math teachers are certified to teach math. The need for math teachers will increase in the next decade as many teachers retire. Nationally, 27% of math teachers are age 50 or over (32% in Minnesota), while only 15% are under age 30 (18% in Minnesota).

Each state has licensure requirements for public school teachers. You can complete Minnesota licensure requirements while at Saint Olaf; see Martha Wallace in OMH 103 for more information. Alternatively, you can obtain licensure and a master's degree through a Master of Arts in Teaching program which combines courses in education and mathematics with an internship experience. For example, check out the programs at Duke ([www.duke.edu/web/MAT](http://www.duke.edu/web/MAT)), Earlham ([www.earlham.edu/mat](http://www.earlham.edu/mat)), and Hamline ([www.hamline.edu](http://www.hamline.edu)).

Some independent (private) schools do not require teachers to be licensed. See the website of the National Association of Independent Schools ([www.nais.org](http://www.nais.org)) for job listings. National and international organizations also are looking for math majors to serve as teachers. The Peace Corps ([www.peacecorps.gov](http://www.peacecorps.gov)) sends math teachers to schools in many countries. Teach for America ([www.teachforamerica.org](http://www.teachforamerica.org)) places recent college graduates in schools in low-income communities after a summer training institute.

## Pig Roast!!!

The Annual Math Department Pig Roast is coming soon! Come join us down at Sechler Park Sunday, May 12<sup>th</sup>, Mother's Day, from Noon 'til Dark (food at 3:30). Tickets will be available soon (remember, mothers are free!).

## Last Week's Solution

**Last week's problem:** It is well-known that the best angle at which to launch a projectile in order to maximize distance traveled across a flat field is 45 degrees. That's all well and good, but what if you are launching apples down Old Main hill? With the angle of inclination of the hill labeled  $\theta$  and assuming a fixed initial velocity, what launch angle (as a function of  $\theta$ ) will maximize distance traveled down the hill?

**Solution:** I received a solution from **Craig Williams** which seems to work, but I don't know why, and one from **Matt Handley**, which is very interesting, but is for a different problem. The optimal angle for firing objects down a hill is halfway between the angle of the hill and the vertical. Note that this agrees with the well-known result when  $\theta = 0$ . A full derivation of this result is too long for the Mess - I will try to make a write-up available - but Linear Algebra aficionados may wish to make a diagram of the trajectory of the object launched at 45 degrees above a flat surface, and consider what happens to that diagram under a shear transformation which fixes the launchpoint and "lowers the ground" by an angle  $\theta$ .

## Problem of the Week

Many good sources of potential Mess problems this week, from Joel Spencer's lecture Thursday evening to Vessey and Larson's talks at the MAA North Central section meeting in St. Cloud over the weekend. Spencer showed a video of Paul Erdős discussing the basic example of Ramsey theory, that if there are six people present at a party, there must either be three who all know each other or three who don't. That no smaller party could have this property is evidenced by drawing a pentagon in blue, and a red star inside that, to represent which pairs of people respectively do or don't know each other. Your problem is to find the largest possible party at which there is no group of **four** people, all of whom know each other or all of whom do not.

\*\* Please submit all solutions to David Molnar ([molnar@stolaf.edu](mailto:molnar@stolaf.edu)) by noon on Sunday.

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