TCU Math Newsletter

Every shape exists only because of the space around it. Hence there is a 'right' position for every shape in every situation. If we succeed in finding that position, we have done our job.

- Jan Tschichold

National Science Foundation Research Experience for Undergraduates Summer Programs

The National Science Foundation (NSF) funds a large number of summer research opportunities for undergraduate students through its REU Sites across the country. Students are granted stipends and, in most cases, housing and a travel allowance.

A list of REU sites in the Mathematical Sciences where you can find details about the individual programs and the application processes can be found at
http://www.nsf.gov/crssprgm/reu/list_result.jsp?unitid=5044
The application deadlines vary for the different sites, but many of the deadlines are in February.

Texas Undergraduate Topology and Geometry Conference: January 30 Registration Deadline for Funding

The annual Texas Undergraduate Topology and Geometry Conference (TeXTAG) will be held on February 20-22, 2015 at the University of Texas at Austin. The conference will be comprised of plenary lectures and student talks. Funding for accommodations and travel is expected to be available for a majority of participants from Texas and adjacent states who register by January 30. For more information and to register, see the conference webpage:
http://www.ma.utexas.edu/conferences/textag/.

TCU Career and Intern Expo on February 4

TCU students interested in meeting employers that are hiring for internships and full time positions are invited to attend the Career and Intern Expo on Wednesday, February 4 from 4:00 pm to 7:00 pm in the Campus Rec Center. This free event is open to students from all majors, and advance registration is not required. Students should bring their TCU IDs to check in the day of the event. Over 100 employers will be at the Expo. In addition, free professional headshots will be offered.

For more information about the Expo and a list of employers attending visit www.careers.tcu.edu.

2015 TCU Student Research Symposium (SRS)

The TCU College of Science and Engineering Research Symposium (SRS) is a relaxed forum in which students can present their work in a poster presentation. The 2015 SRS will be held on April 17, 2015. Updated information about SRS can be found at the SRS website www.srs.tcu.edu.
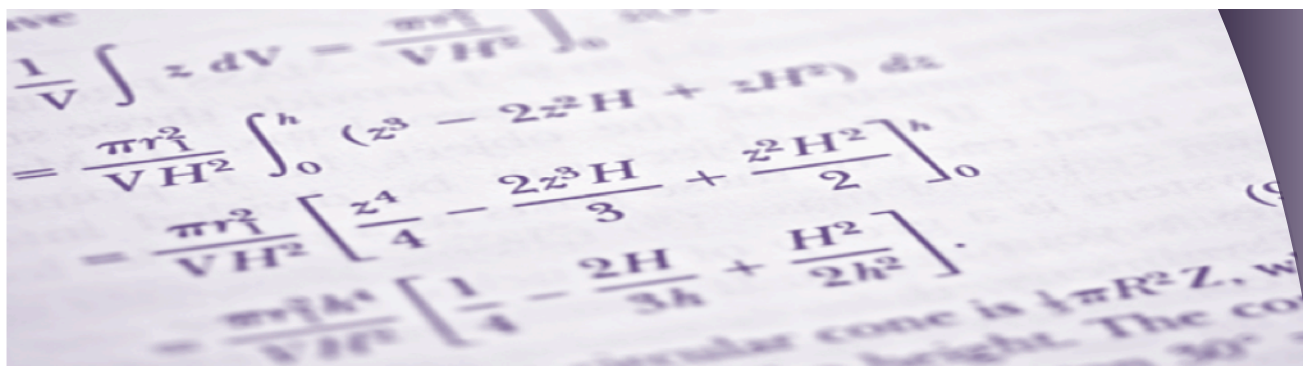
Solution to the November 2014 Problem of the Month

Problem: Each column of a matrix has exactly one 1 and exactly one -1, the rest of its entries being 0. Show that the determinant of every $r \times r$ submatrix is -1, 0, or 1.

Solution: The claim is obvious for 1×1 submatrices; we proceed by induction, assuming the claim for $(r-1)\times(r-1)$ submatrices. If an $r\times r$ submatrix has zeros in a column, then its determinant is zero. If any column has a single nonzero entry, the determinant is ±1 times the determinant of an $(r-1)\times(r-1)$ submatrix and the inductive hypothesis applies. Otherwise, every column has both a -1 and a 1. Thus, multiplying the row vector of all ones by the submatrix yields the zero vector and the determinant of the submatrix must be 0.

The November Problem of the Month was solved by Brad Beadle ('96).

February 2015 Problem of the Month

This month's problem is a one-dimensional version of a two-dimensional question from the USAMO, the most prestigious mathematics contest for U.S. high school students. Players A and B play a game, alternating turns. Player A places a counter on two consecutive integers that do not have a counter on them; then Player B removes one counter that has been played (on any turn). Player A wins if there are ever n consecutive integers with a counter; otherwise, Player B wins. What is the smallest n for which A cannot win if B plays optimally?

Students and others are invited to submit solutions to Dr. George Gilbert by e-mail (g.gilbert@tcu.edu) or hard copy (Math Dept. Office or TCU Box 298900). Correct solutions submitted by persons who are not members of the TCU math faculty will be acknowledged in the next issue of the newsletter. Note that a correct solution is an answer and a justification of its correctness. The solution to the problem will be published in the next edition of the newsletter.