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TCU Math Newsletter

Mediocrity knows nothing higher than itself,
but talent instantly recognizes genius.

- Sir Arthur Conan Doyle

National Science Foundation Research Experience for Undergraduates Summer Programs

The NSF funds a large number of summer research opportunities for undergraduate students through its REU Sites across the country. Each Site consists of a group of about ten undergraduates who work in the research programs of the host institution. Students are granted stipends and, in most cases, housing and a travel allowance. Undergraduate students who participate in the program must be citizens or permanent residents of the United States or its possessions. Several TCU students have participated in REU programs in the past and found them very rewarding.

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

www.nsf.gov/crssprgm/reu/list_result.cfm?unitid=5044

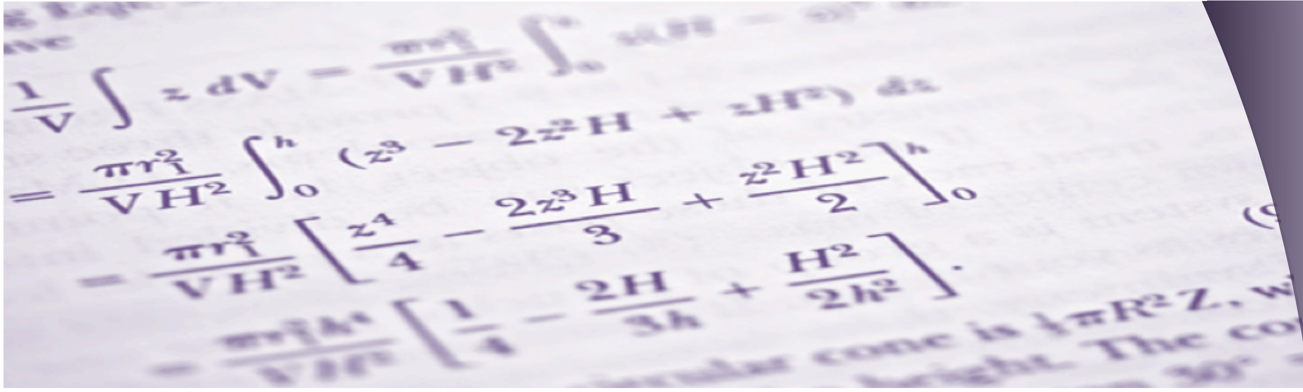
The application deadlines vary for the different sites, but many of the deadlines are in February, so you need to act quickly if you are interested.

Summer Student Research Opportunity in Mathematical Finance at MSRI

The Mathematical Science Research Institute in Berkeley, California is accepting applications for its Summer 2011 Undergraduate Program (MSRI-UP). The MSRI-UP is a comprehensive program for undergraduates that aim to increase the number of students from underrepresented groups in mathematics graduate programs. The program includes summer research opportunities, mentoring, workshops on the graduate school application process, and follow-up support. The topic of the program this summer is Mathematical Finance.

The program will have eighteen students participating in research led by Dr. Marcel Blais of Worcester Polytechnic Institute. The program dates are June 11 – July 24, 2011. Student participants will receive room and board, a $3,000 summer stipend, transportation to and from Berkeley, and funding to attend a national conference.

You can learn more details about the program and apply on line at www.msri.org/up. For full consideration, applications are due February 28, 2011.



Solution to the November 2010 Problem of the Month

Problem: Starting at $(a,0)$, Jessie runs along the x-axis toward the origin at a constant speed s. Starting at $(0,1)$ at the same time Jessie starts, Riley runs at a constant speed 1 counterclockwise around the unit circle until Jessie is far down the negative x-axis. For what integers $a>1$ is there a speed s so that Jessie and Riley reach $(1,0)$ at the same time and $(-1,0)$ at the same time?

Solution: There is an s if and only if a is even. To meet at (1, 0), Jessie's speed must be the ratio of distances Jessie and Riley go. Thus, there must be a nonnegative integer m such that $s=\frac{a-1}{\left(2m+\frac{3}{2}\right)\pi}$. To meet again at (-1, 0), the ratio of the additional distances run must also be s. Hence, for some nonnegative integer n, $s=\frac{2}{(2n+1)\pi}$. Thus, there will be such an s if and only if there exist nonnegative integers m and n for which the two expressions for s are equal, i.e. $a=1+\frac{4m+3}{2n+1}$. The fraction cannot be an even integer, so a cannot be odd. Setting $n=0$ yields $a=4(m+1)$. Setting $n=1$ and $m=3k$, yields $a=4k+2$. Therefore, any even a is possible.

The November problem was solved by Brad Beadle ('96).

February 2011 Problem of the Month

The following is a variant of a recent Putnam problem. Let f be a real-valued function on the plane. Suppose that whenever A, B, and C are vertices of an equilateral triangle, $f(A)+f(B)+f(C)=0$. Must f be identically 0?

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.