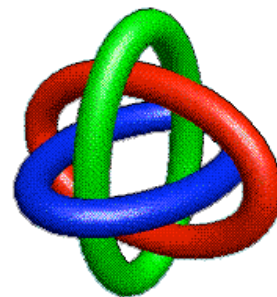


TCU MATH NEWSLETTER



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*Good mathematicians see analogies between theorems or theories,
the very best ones see analogies between analogies.*

- Stefan Banach

Putnam Mathematics Contest

The 71st Annual [William Lowell Putnam Mathematical Competition](#) will be held on Saturday, December 4, 2010, from 9:00 am to noon and 2:00 to 5:00 pm. The [questions](#) require different levels of mathematical background, and all require a bit of ingenuity to solve. The scores on the exam are typically quite low, and even answering a couple of questions is considered an excellent performance. The competition is open to undergraduates enrolled in colleges and universities of the United States and Canada who have not yet received a college degree.

Those interested in signing up to take the Putnam exam this year should contact Professor George Gilbert at g.gilbert@tcu.edu by 5 pm on Tuesday, October 5.

Problem Solving Group

Students interested in honing their problem solving skills this semester, for instance as preparation for the Putnam competition, should contact Professor George Gilbert (g.gilbert@tcu.edu). The group will arrange times to meet once or twice a month.

Southwestern Actuarial Forum

Professor Susan Staples and six TCU undergraduate students attended the Southwestern Actuarial Forum (SWAF) in Dallas on June 4th, 2010. The students participating were Chris Huff, Traci Hughes, Thanh Huynh, Ash Nyangani, Sandy Tirawi, and Nicole Wallace.

TCU Career and Intern Expo

TCU students are invited to attend the Career and Intern Expo on Wednesday, September 23 from 4:00 to 7:00 pm in the Campus Recreation Gym. There will be over 80 local and national employers looking to hire for part-time, full-time and intern positions. Companies such as American Airlines, Lockheed Martin, and Frito Lay will be there to meet and talk to students about employment opportunities. Students attending should dress professionally and bring a resumé. More information, including a complete list of the participating employers, can be found at the web site <https://careers.tcu.edu/student-events.aspx>.

Problems and Solutions

Solution to the April 2010 Problem of the Month

Problem: Let $a < b < c$ be the real roots of a real cubic polynomial $p(x)$. Show that the area between $y = p(x)$ and the x -axis over $[a, b]$ is less than that over $[b, c]$ if and only if

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**Thought of the
Month
Editor:**
Robert Doran

$b-a < c-b$.

Solution: The polynomial has the form $p(x) = r(x-a)(x-b)(x-c)$. The constant r scales both areas by r , so we may assume $r = 1$. The areas over $[a, b]$ and $[b, c]$ are then

$$\int_a^b p(x) dx = (2c-a-b)(b-a)^3 / 12$$

and

$$-\int_b^c p(x) dx = (b+c-2a)(c-b)^3 / 12,$$

respectively. The area over $[a, b]$ is smaller than that over $[b, c]$ if and only if

$0 < (b+c-2a)(c-b)^3 - (2c-a-b)(b-a)^3 = (c-a)^3(a-2b+c) = (c-a)^3[(c-b)-(b-a)]$,
or $b-a < c-b$.

September 2010 Problem of the Month

In a round robin tournament, each team played every other team exactly once. Suppose each game ended in a win or loss; i.e. there were no ties. Suppose there are teams T_1, T_2, \dots, T_n such that team T_i defeated team T_{i+1} for $i = 1, 2, \dots, n-1$, and team T_n defeated team T_1 . Must there be three teams S_1, S_2 , and S_3 , where S_1 defeated S_2 , which defeated S_3 , which defeated S_1 ?

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.