TCU Math News Letter

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And to auoide the tediouse repetition of these woordes: is equalle to: I will sette as I doe often in woorke use, a paire of parallels, or Gemove lines of one lengthe, thus: ═══ , bicause noe .2. thynges, can be moare equalle.

-- Robert Recorde, The Whetstone of Witte. London, 1557

Editor: Dr. Rhonda Hatcher and Archive of Newsletters

Christmas Buffet

The TCU Mathematics Department will hold its annual Christmas Buffet from 11:00 a.m. to 1:00 p.m. on Thursday, December 11 in Winton Scott Hall 171. All TCU mathematics majors and graders are invited to come.

If you would like to attend, please come to the Math Department office to sign up.

TCU Lectureship Series Talk

Professor William Veech of Rice University will be the next speaker in the TCU Mathematics Department Research Lectureship Series. He will present the talk "Billiards in a regular polygon" on Tuesday, January 27. The talk will be presented at 4:00 p.m. in Winton Scott Hall 145, and refreshments will be served in Winton Scott Hall 171 at 3:30 p.m.

Solution to the November 1997 Problem of the Month

Problem: Show that there is a number with 1998 digits such that when the first (leading) digit is moved to the right of the rest of the numbers (i.e. to the ones places), the new 1998-digit number is exactly 3 times the first number.

Solution: Let x denote the leading digit and y the number formed by the succeeding 1997 digits. Then we are given that $10y + x = 3(10^{1997}x + y)$, or $7y = (3\cdot10^{1997} - 1)x$. Because y has 1997 digits and $3\cdot10^{1997} - 1$ has 1998 digits, x=7 is impossible. Thus, we require that $3\cdot10^{1997} - 1$ be divisible by 7. To see this, observe that $3\cdot10^{1997}$ and $3\cdot3^{1997} = 3^{1998} = (3^6)^{333}$ have the same remainder when divided by 7. Since $3^6 = 729 = 104\cdot7 + 1$, the requirement follows. Again using that y has 1997 digits, we conclude that x is 1 or 2, with y equal to $(3\cdot10^{1997} - 1)/7$ or $(6\cdot10^{1997} - 2)/7$, respectively. The numbers look like

$$\underbrace{142857\ldots142857\ldots142857}_{333\text{ times}} \text{ and } \underbrace{285714\ldots285714\ldots285714}_{333\text{ times}}.$$

(Note the similarity to the decimal expansions of 1/7 and 2/7.) This problem was correctly solved by TCU undergraduates Jeff Moles and Chris Poland.

Problem of the Month

This month's problem is due to Marcin Kuczma. It appeared in the November 1996 issue of Crux Mathematicorum, and later as Macalester College's Problem of the Week. How many functions f from {1, 2, 3, 4, 5, 6, 7} to itself are there such that the 351-fold composition $f^{(351)}(x) = x$ for every x?

Students and others are invited to submit solutions to Dr. George Gilbert (Math Dept. Office or P.O. 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.

The TCU Math Newsletter will be published each month during the academic year. Dr. Hatcher: Editor; Dr. Gilbert: Problem Editor; Dr. Doran: Thought of the Month Editor. Items which you would like to have included should be sent to Dr. Hatcher (Math Dept. Office or P.O. 298900).