The Unsolved Problems Conference: Celebrating the living legacy of the mathematics of Richard Guy

To honour Richard Guy and his contributions to mathematical research, these two sessions will feature presentation of mathematics inspired by or stemming from Richard’s work. Each session includes an approximately 50 minute talk followed by 40 minutes available for questions, answers, discussions and reminiscences. Most talks will be recorded (the discussions will not).

Date: Friday, October 2, 2020

Schedule

9:00 AM - 10:30 AM
Session 1: Richard Nowakowski, Unsolved Combinatorial Games Richard K. Guy liked and others he would have liked
Session 2: Jaap Top, The favorite elliptic curve of Richard

11:30 AM - 1:00 PM
Session 1: Bud Brown, The Unity of Combinatorics: Connections and Wonders
Session 2: Carl Pomerance, Aliquot sequences

2:00 PM - 3:30 PM
Session 2: Noam Elkies, Title TBA

Session 1: Respectable recreations: combinatorics in tribute to Richard Guy
Organized by: Alex Fink

The session title nods to Richard’s observation about the rise in stature of combinatorics: when he got his start as a researcher circa 1960 it was mere recreational stuff, but now it’s a respectable branch of mathematics. This session will feature talks on problems, and a touch of history, in combinatorial games, enumeration and sequences, and other topics within the great Unity that Combinatorics. Plenty of time will be left in each block for stories of Richard, whoever may be moved to tell them.

Session 1 Zoom Login: https://ucalgary.zoom.us/j/98344454651
Passcode: 833924
Session 2: Unsolved Problems in Number Theory: a tribute to Richard K. Guy and his contributions to number theory.
Organized by: Michael John Jacobson Jr. and Renate Scheidler

The session title nods to the fame and influence of Richard’s Unsolved Problems in Number Theory book and recognizes that Richard always declared himself much fonder of questions and unsolved problems than answers and solved problems.

Session 2 Zoom Login: https://ucalgary.zoom.us/j/99657231593
Passcode: upint

Abstracts (alphabetical by speaker)

Bud Brown

Title: The Unity of Combinatorics: Connections and Wonders

Abstract:
An account of how a great Guy and his Brown coauthor created a 300-page book entitled "The Unity of Combinatorics" out of a 30-page paper from 1995 of the same name. The latter was an outline of a proposed lecture series, whose purpose was to feature the many connections within the vast area of combinatorics, thereby dispelling the then prevalent notion that combinatorics is just a bag of tricks. In writing the book, we took this notion and ran with it --- and how!

I'll talk about a number of these connections and some topics that seem almost magical, including Beatty sequences, Conway worms, games played with turtles instead of coins, and a way of viewing the non-negative integers as a field. The book begins with a child playing with colored blocks on his living-room rug and ends with a description of the Miracle Octad Generator. Finally, I'll talk about working with this gentlemanly giant of the world of numbers and sequences and patterns and games.

Noam Elkies (Harvard University)

Title & Abstract to be announced

Richard Nowakowski (Dalhousie University)

Title: Unsolved Combinatorial Games Richard K. Guy liked and others he would have liked

Abstract:
Richard started the Unsolved Problems in Combinatorial Games Column. I'll consider some of his favourites, talk about some developments, and add a few reminiscences.

**Carl Pomerance** (Dartmouth College)

**Title:** *Aliquot sequences*

**Abstract:**
These are sequences formed by iterating the sum-of-proper-divisors function. For example: 12, 16, 15, 9, 4, 3, 1, 0. Of interest since Pythagoras, who remarked on the fixed point 6 (a perfect number) and the 2-cycle 220, 284 (an amicable pair), aliquot sequences were also one of Richard Guy's favorite subjects. The Catalan--Dickson conjecture asserts that every aliquot sequence is bounded (either terminates at zero or becomes periodic), while the Guy--Selfridge counter-conjecture asserts that many aliquot sequences diverge to infinity. It is interesting that Guy and Selfridge would make such a claim since no aliquot sequence is known to diverge, though the numerical evidence is certainly suggestive. The first case in doubt is the sequence beginning with 276. This talk will survey what's known about the problem and give evidence for and against the two countervailing views.

**Neil J. A. Sloane** (The OEIS Foundation and Visiting Scholar, Rutgers University)

**Title:** *Richard Guy and the Encyclopedia of Integer Sequences: A Fifty-Year Friendship*

**Abstract:**
Richard Guy was a supporter of the database of integer sequences right from its beginning in the 1960s. This talk will be illustrated by sequences that he contributed, sequences he wrote about, and especially sequences with open problems that he would have liked but that I never got to tell him about.

**Jaap Top** (University of Groningen)

**Title:** *The favorite elliptic curve of Richard*

**Abstract:**
Even in the title of one of his papers, Richard Guy called the elliptic curve with equation $y^2 = x^3 - 4x + 4$ his favorite. During the CNTA-XIV meeting in Calgary in 2016, I recalled some of his reasons for this (with Richard listening from the front row). The story as well as a few additional developments will also be the topic of the present lecture.

We look forward to seeing you on Friday at the conference.

Faculty of Science

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