PIMS DISTINGUISHED SPEAKER

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PRIME NUMBER RACES

Tuesday – June 18, 2019
12:00 pm | D630
** Pizza and donuts **

Abstract:
This talk is a survey of "prime number races." Around 1850, Chebyshev noticed that for any given value of x, there always seem to be more primes of the form 4n+3 less than x than there are of the form 4n+1. Similar observations have been made with primes of the form 3n+2 and 3n+1, primes of the form 10n+3,10n+7 and 10n+1,10n+9, and many others besides. More generally, one can consider primes of the form qn+1,qn+bn,qn+c, ... for our favorite constants q,a,b,c, ... and try to figure out which forms are "preferred" over the others---not to mention figuring out what, precisely, being "preferred" means. All of these "races" are related to the function pi(x) that counts the number of primes up to x, which has both an asymptotic formula with a wonderful proof and an associated "race" of its own; and the attempts to analyze these races are closely related to the Riemann hypothesis---the most famous open problem in mathematics.

We describe these phenomena, in an accessible way, in greater detail; we provide examples of computations that demonstrate the "preferences" described above; and we explain the efforts that have been made at understanding the underlying mathematics.

Bio:
PhD 1997 (U. of Michigan)
Member of the Institute of Advanced Study (1997-1998)
Postdoc, U. of Toronto (1998-2001)
Prof. Martin's area of research is in number theory. He is the author of about 50 articles in this field and has supervised a dozen of graduate students. He has been awarded the Lester Ford prizes for two outstanding expository papers (2002 and 2007) as well as the UBC Faculty of Science Killam Teaching Prize (2007). Prof. Martin is also actively engaged in issues regarding gender inequity in mathematics.

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