Lethbridge Number Theory and Combinatorics Seminar

Monday — March 27, 2017
Room: B660
Time: 12:00 to 12:50 p.m.

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On the Solutions of Certain Congruences

Abstract: An odd prime p is called a *Wieferich prime* (in base 2), if

$$2^{p-1} \equiv 1 \pmod{p^2}.$$

These primes first were considered by A. Wieferich in 1909, while he was working on a proof of Fermat's last theorem. This notion can be generalized to any integer base $a > 1$. In this talk, we discuss the work that has been done regarding the size of the set of non-Wieferich primes and show that, under certain conjectures, there are infinitely many non-Wieferich primes in certain arithmetic progressions. Also we consider the congruence

$$a^{\varphi(m)} \equiv 1 \pmod{m^2},$$

for an integer m with $(a, m) = 1$, where φ is Euler's totient function. The solutions of this congruence lead to Wieferich numbers in base a. In this talk we present a way to find the largest known Wieferich number for a given base. In another direction, we explain the extensions of these concepts to other number fields such as quadratic fields of class number one. We also consider the solutions of the congruence

$$g^m - g^n \equiv 0 \pmod{f^m - f^n},$$

where m and n are two distinct natural numbers and f and g are two relatively prime polynomials with coefficients in the field of complex numbers. We prove this congruence has finitely many solutions.

EVERYONE IS WELCOME!

Visit the seminar web page at
http://www.cs.uleth.ca/∼nathanng/ntcoseminar/

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