

Lethbridge Number Theory and Combinatorics Seminar

Monday — February 29, 2016

Room: C630

Time: 12:00 to 12:50 p.m.

Robert Craigen University of Manitoba Survey of Negacyclic Weighing Matrices

Abstract: A square or rectangular matrix is circulant if every row after the first is a right circular shift of its predecessor. Negacyclic matrices are defined the same way except that the first entry of each row is negated after circulating the preceding row. A partial Hadamard matrix is a rectangular $k \times n$ $(1, -1)$ -matrix M satisfying $MM^T = nI$.

In the summer of 2013 I hired four sharp undergraduate students to tackle a problem about circulant partial Hadamard matrices. The question of existence of certain negacyclic weighing matrices kept coming up, so we devoted some energy to exploring this largely uncultivated territory. In the end we produced, apparently for the first time, a fairly comprehensive survey of these objects, their structure, why certain classes exist and others cannot. The flavour of the existence questions for this class of weighing matrices is decidedly different from that of group-developed form, even though much of the theory is the same.

We discuss some situations in which negacyclic weighing matrices naturally appear, and conclude with some tantalizing new open questions arising from the work.

EVERYONE IS WELCOME!

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



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