

CCSU
DEPARTMENT OF MATHEMATICAL SCIENCES
COLLOQUIUM

Friday, October 31

3:00 – 4:00 PM

Maria Sanford, Room 101

ALL THE RIGHT “GRATES”

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Abstract: This work was inspired by a “grate” talk given by Professor Darrow last year at the CCSU Mathematics Department Colloquium! An (n, k) -grate is a binary n -tuple containing k ones, such that there are never two adjacent zeroes. In his talk last year, Darrow developed a formula for counting the number of grates in terms of the parameters n and k , and considered the process of flipping the bits (0’s turning into 1’s) of a sequence of n zeroes until a grate is created. This talk was so “grate” that it inspired us to extend this work to higher dimensions! After first defining several types of two-dimensional grates, we developed computer programs to generate all the $m \times n$ grates with k -ones for small values of m and n . This revealed a number of “grate” connections to well-known sequences as well as a wide range of chess problems. Returning to the original problem of expectation, we began considering the process of randomly flipping the bits in two-dimensional arrays until a grate is created. This led to an initial result on $2 \times n$ grates.

In this presentation, the results from the original “grate” problem will be reviewed before detailing more recent work on higher dimensions. The computer programs used to generate small examples and the connections this problem has with other well-known work will also be discussed. Finally, a discussion of how meaningful this project was for all involved will be given.

To join us online use the following link: <https://ccsu.webex.com/meet/gotchev>

For further information: gotchevi@ccsu.edu; 860-832-2839;

<http://mathcolloquium.sites.ccsu.edu/>