Math & Computer Science Colloquium

Presents:

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Speaking on:

Sum of Continued Fraction Expansions

Continued fractions can be thought of as base-free expressions of real numbers and their utility in solving problems such as Pell's equation is well-understood. In particular, if you take the square root of a non-square integer D, the continued fraction expression of the $\sqrt{D}$ is known to be periodic. Yet the length of the period is slightly mysterious, and much of the available literature explores the length of this period. However, there is no literature on the sums of the terms in the period. Related to the continued fraction expansion of $\sqrt{D}$ is the quadratic form $Q(x,y)=x^2-Dy^2$. This can be seen by factoring the form as $x^2-Dy^2=(x+\sqrt{D}y)(x-\sqrt{D}y)$. A particularly useful technique for investigating this quadratic form is the topograph. The topograph of this particular form is known to be periodic, and this period is somewhat mysterious as well. However, this period is not the period of the continued fraction representation of $\sqrt{D}$, but rather it is related to the sum of the terms of the continued fraction representation. In this talk, we will introduce continued fractions, topographs of quadratic forms, and show how topographs can be used to help find an upper bound for the growth of the period sequence. This talk will be accessible to a general audience.

February 9, 2012
Palenske 227
3:30 PM
All are Welcome!