Geometry Seminar  
Tuesday, October 25, 2011  
Room 512 WWH at 6:00 P.M.

Guarding polyominoes

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We explore the art gallery problem for the special case that the domain (gallery) $P$ is an $m$-polyomino, a polyform whose cells are $m$ unit squares.

We study the combinatorics of guarding polyominoes in terms of the parameter $m$, in contrast with the traditional parameter $n$, the number of vertices of $P$; in particular, we show that $\left\lfloor \frac{m+1}{3} \right\rfloor$ point guards are always sufficient and sometimes necessary to cover an $m$-polyomino.

When $m \leq 3n/4$, the point guard sufficiency condition yields a strictly lower guard number than $\left\lfloor \frac{n}{4} \right\rfloor$, given by the art gallery theorem for orthogonal polygons. When pixels behave themselves like guards (pixel guards), we prove that $\left\lceil \frac{3m}{11} \right\rceil + 1$ guards are sufficient and sometimes necessary to cover an $m$-polyomino.

We also study the algorithmic complexity of computing optimal guard sets for polyominoes.

For more information please visit the seminar website at: http://www.math.nyu.edu/seminars/geometry_seminar.html.