Nov. 1 Richard Stanley, UC Berkeley and MSRI

*The characteristic polynomial of a hyperplane arrangement*

An arrangement $A$ is (for this talk) a finite set of affine hyperplanes in a vector space over a field $K$. A fundamental combinatorial invariant of an arrangement is a polynomial $X(t)$ called the *characteristic polynomial* of $A$. We will discuss some applications of the characteristic polynomial, including the counting of regions of the complement $L$ of the hyperplanes in $A$ when $K=\mathbb{R}$ (the real numbers), the computation of the homology of the complement of the hyperplanes in $A$ when $K=\mathbb{C}$ (the complex numbers), the partial computation of the Smith normal form of a "distance matrix" associated with $A$, the computation of the eigenvalues of a certain random walk on the regions of the complement $L$ (when $K=\mathbb{R}$), and the counting of points lying on none of the hyperplanes when $K$ is finite. Some examples of interesting characteristic polynomials will be given, including those that satisfy a "Riemann hypothesis."