1048-05-213 **Kevin Woods*** (Kevin.Woods@oberlin.edu), Department of Mathematics, Oberlin College, Oberlin, OH 44074. *Combinatorics and Graphical Models: investigating inference functions.*

Graphical models are important statistical tools in a wide variety of fields, ranging from computational biology to probabilistic artificial intelligence. I will discuss the interrelationship between combinatorics – particularly discrete geometry – and inference functions for these models.

I will concentrate on two results. First an applied result whose proof requires combinatorics: even though it seems there should be extraordinarily many inference functions for a given model, there is a bound that is polynomial in the size of the model, for a fixed number of parameters. Second a pure result discovered while exploring inference functions: the probability that m points randomly chosen in $\mathbb{Z}^d$ can be completed to a basis of $\mathbb{Z}^d$ is $1/(\zeta(d)\zeta(d-1)\cdots\zeta(d-m+1))$, where ζ is the Riemann zeta function.

This is joint work with Sergi Elizalde. (Received February 08, 2009)