1083-14-1 **Henry K. Schenck***, University of Illinois, 1409 Green St., Urbana, IL. *From Approximation Theory to Algebraic Geometry: the ubiquity of splines.*

Piecewise polynomial functions on a simplicial complex (splines) are fundamental objects in mathematics, with applications ranging from approximation theory and numerical analysis to algebraic geometry, where they appear as the equivariant Chow ring of a toric variety.

For a fixed simplicial complex $\Delta \subseteq \mathbb{R}^n$, the set of splines of smoothness $r$ and polynomial degree at most $k$ is a vector space $C^r_k(\Delta)$, and a fundamental question in approximation theory is to determine the dimension of this vector space. In 1973, Strang conjectured a formula for the dimension $C^1_2(\Delta)$ when $\Delta$ is planar. Billera solved the conjecture in 1987 using homological techniques. Further progress on the planar case was made by Alfeld-Schumaker, who obtained an exact formula for the dimension of $C^r_k(\Delta)$, when $k \geq 3r+1$. I'll spend most of the talk giving an overview of the problem and describing how homological algebra comes into the picture. Many of the techniques available in the simplicial case do not extend to the setting of polyhedral complexes, and I'll wrap up the talk with a discussion of recent progress on the dimension question for polyhedral splines (part of this work is collaboration with T. McDonald) (Received March 25, 2011)