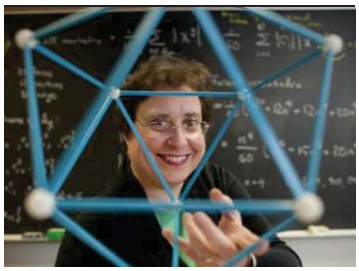
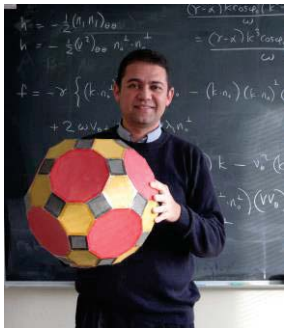
Program Abstracts



SUSAN JANE COLLEY, Oberlin College, *Counting Curves: Tales from the Enumerative Crypt*

Abstract: We will consider the Steiner problem (1848) of five conics: to determine how many conics are simultaneously tangent to five others. We will review some of the history surrounding this problem and some of the ingredients needed to solve it. Finally, we'll speed ahead to modern times and briefly sketch joint work with Gary Kennedy (*Ohio State University*) and Lars Ernström (*Ericsson*) that uses mathematical techniques inspired by ideas in theoretical string theory to address some analogous questions about "higher-order" contact of plane curves.

JESÚS DE LOERA, UC Davis, *For linear algebra lovers: Carathéodory's theorem and its relatives*



Abstract: Are you someone that found linear algebra the most awesome and beautiful subject in the universe? Do linear equations and vectors make you smile? Then I have the theorem for you: Carathéodory's Theorem! It states that any vector in the convex hull of a subset X of $\mathbb{R}^d$ can be expressed as a linear convex combination of at most $d + 1$ vectors of the set X. It is a variation on the basic fact that vectors in $\mathbb{R}^d$ can be expressed as linear combination of a basis (with d vectors). My talk will consider this lovely theorem, and its many relatives and variations. I will show some applications (e.g., in economics, logistics, and signal processing) and how it touches in the inner depths of the mathematician's soul. I will offer open questions for people young and old to solve, so come prepared to fall in love with $A\mathbf{x} = \mathbf{b}$ once more!!

DEANNA HAUNSPERGER, Carleton College, *Halving Your Cake*

Abstract: Here is a problem as old as humanity: given a resource to be shared (water, land, cake), how can it be shared fairly between several people? The answer, in the case of two claimants, is simple and ancient and known to every five-year-old with a sibling: I cut; you choose. Things get much more interesting, and challenging, if one has more than one sibling. How do we make fair divisions?

SERKAN HOŞTEN, San Francisco State University, *Applied Algebraic Geometry Explained with Pictures*

Abstract: Algebraic geometry is the study of geometric shapes that are solutions sets of polynomial equations. In the last 25 years, advances in symbolic and numerical methods made meaningful applications of this field possible. This talk will survey various applications in optimization, robotics, and data science.

PAUL ZEITZ, University of San Francisco, *How vs. Why, part II*

Abstract: The last time I gave a talk at a regional MAA meeting, I discussed the importance of striving for understanding *why* something is true rather than settling for seeing *how* it is true. I still consider this to be the central question in mathematics, yet it is often something few students are even aware of. I will recycle some of my favorite examples from the earlier talk, and share some new examples as well.