

MAA SoCal - Nevada Spring Section Meeting and Pacific Coast Undergraduate Mathematics Conference

California Lutheran University
March 14, 2015

POSTER SESSION: ABSTRACTS

Pre-college

Kyle Kishimoto - Fairmont Private Schools and Fullerton Mathematical Circle

A Game of Squares

We discuss several solutions to problems proposed in recent issues of *Gazeta Matematica*. One of our solutions uses multivariate calculus to obtain an extremum value, while another solution explores properties of integers.

Joshua Park - Fullerton Mathematical Circle

Solving Algebraic Equations: A Discussion Inspired by Problem S: L14.281 from Gazeta Matematica

When we solve algebraic equations with radicals, what are the conditions we need to consider? We solve a problem from *Gazeta Matematica*, using a technique inspired by the classical Schönemann-Eisenstein Theorem. Then, we look at two other examples of equations with radicals.

Henry Zeng - Holly Avenue Elementary School and Fullerton Mathematical Circle

Explorations in Advanced Euclidean Geometry

We present our solutions to several geometry problems proposed in recent issues of *Gazeta Matematica*.

College Junior/Senior

Miranda Bakke - CSU Fullerton

Exploring Cauchy-Schwarz Inequality: Remarks on Problem 11670 from the American Mathematical Monthly

We explore many applications of the Cauchy-Schwarz Inequality. One the inequalities we obtain was published in the *American Mathematical Monthly* as Problem 11670. In our poster presentation, we describe our project, our explorations of the so-called Engel's Lemma, our references and classical similar inequalities (e.g. Nesbitt's inequality).

Brenna Biggs - CSU Fullerton

Remarks on the Maximum Values for Classical Curvature Invariants for Smooth Three-Dimensional Hypersurfaces

The mean curvature H , scalar curvature s , and Gauss-Kronecker curvature K are the natural curvature invariants for a three-dimensional smooth hypersurface in the four-dimensional Euclidean ambient space. At every point of the hypersurface H , s , and K can be defined as a function of the principal curvatures. The present project studies the range of these classical curvature invariants, H , s , and K , for a compact three-dimensional smooth hypersurface in the four-dimensional Euclidean ambient space, under certain natural constraints described also in terms of curvature.

STUDENT TALKS: ABSTRACTS

Christina Tran - CSU Fullerton

On Sophie Germain's Essays

Sophie Germain (1776-1831) is remembered today for introducing the mean curvature in differential geometry, and is better known for her work in number theory and elasticity. In our talk, we present an overview of Germain's academic and professional accomplishments and we discuss how relevant and interesting are her essays. We also present new translations of several fragments of her texts.

Rudolph Saenz and Erick Ortega - CSU Fullerton

Importance of Sampling Pattern and Regularization in Under-Sampled Magnetic Resonance Imaging (MRI)

Our project seeks to optimize under-sampled Magnetic Resonance Imaging (MRI). We look at the effectiveness of accelerated acquisition and constrained reconstruction using the Shepp-Logan phantom. Our current research focuses on determining how different sampling methods can either improve or hinder the effect of reconstructing an object from incomplete frequency samples using a total variation regularization method. In our approach, we implemented a total variation reconstruction to an under-sampled Fourier data, where the sampling methods include Evenly Spaced (ES), Beginning-Middle-End (BME), and Low Frequency (LF) sampling. We analyze the relationship between an alpha constraint, the strength of the total variation regularizer, in our reconstruction and the amount of data that is collected during the sampling methods in order to determine the optimal alpha value. We found that the BME sampling method gave us the best performance in terms of the mean squared error.