SPRING 2006

M*A*T*H COLLOQUIUM

64th SERIES

Wednesdays 4p.m. Stevenson 1002

THE MATHEMATICS DEPARTMENT OF SONOMA STATE UNIVERSITY PRESENTS A SERIES OF INFORMAL TALKS OPEN TO THE PUBLIC

"Mathematics is the process of turning coffee into theorems" –Paul Erdös

Feb 8 **THE TRIANGLE: GREATEST HITS.** RICK LUTTMANN, DEPARTMENT OF MATHEMATICS, SONOMA STATE UNIVERSITY

The speaker will reprise some of the results (special triangle points, vantage point theorem, nine-point circle, Steiner's, Ceva's and Desargues' theorems, Paschal's magic hexagons) discussed in his Fall 2005 talk and add new ones: orthic lore, theorems of Meyer, Van Lamoen, Wallace, Sachelarie, and Bellot-Rosada, and a new result by the speaker, Chakerian, de Guzman and Romero Marquez.

Feb 15 **SOME CAR PROBLEMS ARE MATHEMATICAL**. RICK POSS, ST. NORBERT COLLEGE, DE PERE, WISCONSIN

Cars are a large part of our lives. In our daily driving experiences, we often encounter mathematical situations. We will discuss a variety of these elementary problems.

Feb 22 **STUDENT PROJECTS.** ELAINE MCDONALD, DEPARTMENT OF MATHEMATICS, SONOMA STATE UNIVERSITY

Students will present projects using Mathematica from the Fall 2005 Math 180 class taught by Prof. McDonald. [☺ Pizza after talk ☺]

Mar 1 **SLICING BAGELS: PLANE SECTIONS OF REAL AND COMPLEX TORI.** DAVID SKLAR, SAN FRANCISCO STATE UNIVERSITY

We first see how a number of familiar curves (along with some surprises) arise as plane sections of an ordinary circular torus. We also try to understand why the graph of a particular cubic equation is a torus. This involves an algebraic closure, a geometric closure and some plane sections from the first part of the talk.

Mar 8 **NEVER UNDERESTIMATE A THEOREM THAT COUNTS SOMETHING.** TYLER EVANS, HUMBOLDT STATE UNIVERSITY

Mathematicians love a good counting argument, especially when applications of it yield a variety of seemingly unrelated results. In this talk, we will generalize a combinatorial lemma to obtain three divisibility theorems for which three classical theorems (Fermat's (little), Wilson's and Lucas') are special cases. The talk is appropriate for all undergraduate mathematics students and those with experience in abstract algebra and number theory are particularly encouraged to attend.

Mar 15 **WHEN QUILTERS AND CARVERS MARRY, STARS AND POLYGONS HAPPEN.** ANN HERBST, SANTA ROSA JUNIOR COLLEGE

To create polygons and stars, folk artists ask, "How do I divide a circle into *n* equal parts?" This question leads to divisibility problems in number theory, as well as various geometric construction methods and approximations.

Mar 22 **THE MATHEMATICS OF COMPLEXITY.** DEBORA HAMMOND, HUTCHINS SCHOOL, SONOMA STATE UNIVERSITY

The speaker will give an overview of cutting-edge work in the field of complexity, focusing on such topics as non-linear dynamics, agent-based modeling, networks and power laws. In addition, she will share results from a collaborative project with other scholars entitled "Can Complexity Studies Advance Sustainability? Scaling in Natural and Social Systems."

Mar 29 **HOW TO UNTIE A KNOT (AND BECOME RULER OF THE WORLD).** THOMAS MATTMAN, CHICO STATE UNIVERSITY

The legend of the Gordian knot held that whoever untied the knot would become the ruler of the world. Alexander the Great fulfilled the prophecy by going on to conquer Persia (in other words, most of the known world) after dealing with the famous knot. We will discuss Alexander's method for untying knots and how recent research connecting mathematics and physics has given new insight into this program. The talk will also feature some square knot dancing.

Apr 5 **A UNIFIED APPROACH TO GRAPHING RATIONAL FUNCTIONS.** STEVE WILSON, DEPARTMENT OF MATHEMATICS, SONOMA STATE UNIVERSITY

Rational functions of the same degrees can have very different looking graphs depending on the location of the roots for the numerator and denominator. However, given degrees for numerator and denominator, it is possible to derive one formula that will cover all cases.

[☺ Pizza after talk ☺]

Apr 12 **A STAR IS BORN.** KEMBLE YATES, SOUTHERN OREGON UNIVERSITY

Stars are born, they live, and then die. But HOW are they born? James Jeans gave us a modern theory of star formation, complete with mathematical and physical analysis, in 1902. The speaker will give a short history of developments since then, including a model of his own and conclude with the state of the star formation theory today

Apr 26 **THE MATH INSTINCT: THE AMAZING MATHEMATICAL ABILITIES OF ANIMALS, BIRDS, INSECTS AND BABIES AND WHAT CAN WE LEARN FROM THEM.** KEITH DEVLIN, EXECUTIVE DIRECTOR, CSLI, STANFORD UNIVERSITY **[MATH FESTIVAL]**

Many people think they do not have mathematical ability. But they are wrong. Numerous studies have shown that practically every one of us has considerable facility with basic math. We just don't know it. Give the average person a math test and they will score poorly. But present them with the very same problems in the form of a real-life activity (which they maybe don't think of as math) and they will score in the 95-100% range. In fact, it's not just ordinary people that have mathematical abilities. So do several species of animals. You don't believe any of this? Then come to the talk.

Apr 19 **SPRING BREAK**

May 3 **MATHEMATICS AND A LIBERAL EDUCATION: STRATEGIES FOR APPRECIATION AND SKILL BUILDING.** MUTOMBO M'PANYA, HUTCHINS SCHOOL, SONOMA STATE UNIVERSITY

For the most part, teaching mathematics to liberal education students has emphasized mathematical skills; there is little effort to foster an appreciation of mathematical culture. The speaker will discuss a different strategy, which is to build both mathematical skills and appreciation through seminar discussion and critical thinking. He will explore the approaches used in his course "Mathematics and Human Imagination" taught in the Hutchins School of Liberal Studies. Students who have been working on these strategies will be part of the discussion.

[☺ Pizza after talk ☺]

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Talks may change: Please confirm with the Mathematics Office before a specific talk