THE MATHEMATICS DEPARTMENT OF CALIFORNIA STATE COLLEGE, SONOMA

presents a series of lectures and informal discussions

M *A* T *H

COLLOQUIUM

Fall 1974

TUESDAYS at 1:00 p.m.   DARWIN HALL, Room 120
DISCUSSION FOLLOWING AT 2:00 p.m.

In a way, mathematics is a philosophical technique or process which is conventionally used to pose and solve problems of all sorts. Mathematicians are seemingly fond of describing their subjects as "elegant" or even "profound". As teachers of mathematics, we find that presentation of ordinary course material does not always afford sufficient opportunity to discuss many topics which each of us has found to be totally fascinating. Hence, we inaugurate this series of talks and invite all members of the college community and the public to attend. We are concerned with bits and pieces -- and even whole theories! -- of interesting mathematics, with deliberate attention to exposition designed to educe discussion, without the headlong rush to find the answers in the back of the book.

SEPTEMBER 17   ON BEING THE RIGHT SIZE
Frederick Luttmann, Associate Professor of Mathematics   40

SEPTEMBER 24   REAL APPLICATIONS OF LINEAR PROGRAMMING - 55
FROM THE CRADLE TO THE GRAVE
Clement Falbo, Professor of Mathematics

OCTOBER 1   INFINITY   70
Jean Stanek, Assistant Professor of Mathematics

OCTOBER 8   ELEMENTARY IDEAS IN GRAPH THEORY   40
Robert Johnson, Associate Professor of Mathematics

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Shanna Freedman, Associate Professor of Mathematics

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"WHY, IN A CURVE ISOCHRONOUS"   51
Thomas Volk, Associate Professor of Mathematics

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Charles Rhinehart, Professor of Education

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Charles Phillips, Professor of Mathematics

THE MATHEMATICS DEPARTMENT OF CALIFORNIA STATE COLLEGE, SONOMA

PRESENTS A SERIES OF LECTURES AND DISCUSSIONS

M * A * T * H

COLLOQUIUM

SPRING 1975 SECOND SERIES

THURSDAYS at 4:00 p.m.   **DARWIN HALL, ROOM 108**   **COFFEE at 3:30 p.m.**

FEBRUARY 13   PICTORIAL NUMBER THEORY

Dr. Newman Fisher, Department of Mathematics, San Francisco State University, will discuss the way to count certain things in number theory by drawing pictures.

FEBRUARY 20   WHAT IS A LATIN SQUARE?

Dr. Alan B. Cruse, Department of Mathematics, University of San Francisco, will speak on some results, problems and historical aspects of a simple type of combinatorial design found in various parts of mathematics.

FEBRUARY 27   ECONOMISTS AND THEIR TOOLS

Dr. Sue Eileen Hayes, Department of Economics, California State College, Sonoma, will present a discussion of some of the mathematical and statistical procedures economists use in macroeconomic and microeconomic decision-making.

MARCH 6   APPLICATION OF CATASTROPHE THEORY TO HEARTBEAT

Dr. S. Y. Tang, Department of Mathematics, San Francisco State University, will use qualitative mathematical arguments to derive heartbeat equations.

MARCH 13   NON-EUCLIDEAN GEOMETRY AND OTHER NONSENSE

Dr. Frederick Luttmann, Department of Mathematics, California State College, Sonoma, will give a brief historical account of the centuries-long process of collectively realizing that mathematical geometry and physical geometry are entirely separate and distinct; bizarre mathematical geometries can be respectable and legitimate. Physical geometry just might surprisingly turn out to be one of the more bizarre mathematical geometries.

MARCH 20   THE MOEBIUS BAND — AND THEIR "ONE-SIDED" RELATIVES

Dr. Maxine Goldberg, Department of Mathematics, San Francisco State University, will discuss whether a Moebius band is one-sided or two-sided and what would happen if two bands were glued together.

APRIL 3   GUESSING AND PROVING IN EULER'S WORK

Dr. George Polya, Professor Emeritus, Department of Mathematics, Stanford University, will tell the story of Euler's discovery of the relation between the numbers of faces, edges and vertices of a polyhedron.

APRIL 10   PARITY IN PROOF or HOW TO USE ODD AND EVEN

Dr. Robert Johnson, Department of Mathematics, California State College, Sonoma, will show how the concepts of odd and even (parity) have been applied in widely different areas of mathematics such as analysis and combinatoric.

APRIL 17   PROBLEM SOLVING FOR FUN AND PROFIT or THE TRUTH ABOUT SYSTEMS ANALYSIS

Dr. Peter Stanek, Systems Applications Incorporated, will present a pithy essay on the prominent philosophical modes of inquiry associated with systems analysis. It will be shown that a wide range of formal techniques from purely intuitive to strictly systematic are available to the analyst.

APRIL 24   THE POWER OF TWO

Dr. Ben G. Roth, visiting Associate Professor of Mathematics, University of California, Davis, will give an analysis of several mathematical games and problems with solutions involving powers of two — sometimes in quite subtle and surprising ways.

MAY 1   HOW TO GET (AT LEAST) A FAIR SHARE OF THE CAKE

Dr. Kenneth R. Rebman, Department of Mathematics, California State University, Hayward, will examine some generalizations to n persons of the famous "you cut -- I'll choose" principle and present some truly hard-to-believe (and unfortunately hard-to-implement) results.

MAY 8   COMPUTERS -- CAN THEY DO EVERYTHING?

Dr. Thomas Nelson, Department of Mathematics, California State College, Sonoma, will discuss some of the tasks computers can do, as well as one task the computers cannot do.

THE MATHEMATICS DEPARTMENT OF CALIFORNIA STATE COLLEGE, SONOMA

PRESENTS A SERIES OF LECTURES AND DISCUSSIONS

M·A·T·H
COLLOQUIUM

FALL 1975 THIRD SERIES

THURSDAYS at 4:00 p.m.   **DARWIN HALL, ROOM 108**   **COFFEE at 3:30 p.m.**

SEPT 18 **COMMUNICATION MATRICES**
James T. Johnson, Department of Mathematics, Dominican College of San Rafael, will present two applications of elementary matrix algebra to problems in socioeconomic and intrabusiness communication systems. Reference will be made to the use of BASIC computer programs to simplify tedious calculations.

SEPT 25 **THE MATHEMATICAL THEORY OF GAMBLING TO WIN**
Dr. Charles Antoniak, Department of Statistics, University of California, Berkeley, will discuss the best strategies for favorable games with applications to investing.

OCT 2 **COMPLEX VARIABLES — DIVINELY INSPIRED**
Dr. Evelyn Silvia, Department of Mathematics, University of California, Davis, will discuss the nature and impact plus a bit of the history of complex variables.

OCT 9 **THE DISTRIBUTION AND REMOVAL OF INSULIN IN MAN AND DOG**
Dr. Abraham Silvers, Senior Biostatistician at Kaiser Foundation Research Institute will discuss a mathematical model describing the metabolism of insulin in man and dog.

OCT 16 **CLOSURE, INTERIOR AND UNION IN FINITE TOPOLOGICAL SPACES**
Dr. Louise Moser, Department of Mathematics, California State University, Hayward, will speak on the variation of a problem of Kuratowski, particularly as it relates to finite topological spaces.

OCT 23 **A VERY SIMPLE QUESTION**
Dr. Sherman Stein, Department of Mathematics, University of California, Davis, will illustrate the roles of application, curiosity, and frustration in the development of mathematics. He will use as an illustration a very simple new question concerning coloring boxes that are arranged in a square pattern.

OCT 30 **THE THEORY OF CONFLICTS**
Dr. Frederick Luttmann, Department of Mathematics, California State College, Sonoma, will talk about the elementary theory of pay-off matrices, saddlepoints and mixed strategies using a variety of example situations including a Sherlock Holmes adventure, the opera "Tosca," the game of chicken and others.

NOV 6 **AREA AND VOLUME**
Dr. John Kelley. Department of Mathematics, University of California, Berkeley, will discuss the question: Is a grapefruit bigger than an orange?

NOV 13 **HOW MANY NECKLACES CAN A NECKLACE-MAKER MAKE?**
Dr. R. H. Johnson, Department of Mathematics, California State College, Sonoma, will discuss applications of elementary group theory to problems of counting and a novel application of Pascal's Triangle.

NOV 20 **SURVEY RESEARCH**
Dr. David Freedman, Department of Statistics, University of California, Berkeley, will show how to choose a sample and what to watch out for when someone else does it.

DEC 4 **SOME REFLECTIONS ON SYMMETRY AND MAXIMIZATION**
Dr. James Finch, Department of Mathematics, University of San Francisco, will examine an area maximization problem from several points of view and in doing so will discuss its relationship to symmetry and reflection.

DEC 11 **THE GEOMETRY OF JOINING AND EXTENDING**
Dr. James Jantosciak, Department of Mathematics, Brooklyn College, will show how Euclid's constructions of connecting two points to form a line segment and prolonging a line segment beyond one of its endpoints can be formalized as the operations of joining and extending - operations with some properties similar to those encountered when multiplying and dividing.

THE MATHEMATICS DEPARTMENT OF CALIFORNIA STATE COLLEGE, SONOMA

PRESENTS A SERIES OF LECTURES AND DISCUSSIONS

M * A * T * H

COLLOQUIUM

SPRING 1976 FOURTH SERIES

THURSDAYS at 4:00 p.m.   **DARWIN HALL, ROOM 108**   **COFFEE at 3:30 p.m.**

FEB 12   VISUALIZATION, PERSPECTIVE AND PERCEPTION
Patrick J. Boyle, Mathematics Department, Santa Rosa Junior College, will look at some interesting and entertaining visual materials which may raise some important questions related to visualizing, representing and interpreting. Is what you see really what you get?

FEB 19   THE MATHEMATICS OF ARTIST M. C. ESCHER
Dr. Marvin Winzenread, Department of Mathematics, California State University, Hayward, will discuss Maurits Escher, whose works include concepts from modern algebra, modern geometry and topology, although he claimed no training in the "exact sciences."

FEB 26   THE ILLOGICALITY OF THE JENSEN-SHOCKLEY ARGUMENT
FOR RACIAL DIFFERENCES IN INNATE INTELLIGENCE
Dr. Ron Baker, Biology Department, California State College, Sonoma, will analyze how the improper application of the elementary statistical concept, variance, to a problem in genetics leads to an illogical conclusion.

MAR 4   GAMES YOU CAN PLAY WITH THE SEQUENCE 1/n
Dr. Don Duncan, Mathematics Department, California State College, Sonoma, will show some surprising properties of the sequence 1/n. One of these, which appears to be a very startling result, will be proved using only the simplest of high school algebra.

MAR 11   DIZZINESS: A MATHEMATICAL MODEL
Dr. Susann Shaw, Department of Mathematics, San Francisco State University will discuss a mathematical model of the mechanics of the semi-circular canals in the inner ear and show how it is used to explain dizziness.

MAR 18   THE AXIOM OF CHOICE
Dr. William Barnier, Mathematics Department, California State College, Sonoma, will give a brief historical account of this controversial axiom along with an elementary discussion of some of the surprising and "unpleasant" results of using it and not using it.

MAR 25   COMPUTATION OF FLUID DYNAMICS
Dr. Raul Mendez, Mathematics Department, College of Marin, will discuss flow patterns and valves.

APR 1   KÁRMÁN VORTEX STREET
Dr. V. A. Patel, Department of Mathematics, Humboldt State University, will discuss a mathematical model of Kármán vortex street formed past a circular cylinder in viscous incompressible fluid.

APR 8   HOW TO COUNT RABBITS
Dr. Allan B. Cruse, Department of Mathematics, Univeristy of San Francisco, will show how the clever use of an infinite algebraic formula leads to the solution of a famous counting problem posed by the medieval mathematician, Fibonacci.

APR 22   MATHEMATICAL MODELING IN BIOLOGY
Dr. Clem Falbo, Mathematics Department, California State College, Sonoma, will discuss what a mathematical model is and what it is not. He will show why and how to model and give some examples of mathematical models in biology.

APR 29   MATHEMATICS AND THE STOCK MARKET --- HOW TO GAMBLE WISELY
Dr. Robert Pisani, Department of Statistics, University of California, Berkeley, will discuss the application of probability theory to favorable and unfavorable games of chance, and a class of stock market strategies which yield unusually high rates of return.

MAY 6   SNAILS AND PUPPY DOG TAILS --- SPIRALS AS A LAW OF GROWTH
Dr. Shanna Swan, Mathematics Department, California State College, Sonoma, will discuss some topics related to the Golden Ratio, Fibonacci sequences, and the logarithmic spiral.

THE MATHEMATICS DEPARTMENT OF CALIFORNIA STATE COLLEGE, SONOMA

PRESENTS A SERIES OF LECTURES AND DISCUSSIONS

M·A·T·H
COLLOQUIUM
FALL 1976   Fifth Series

THURSDAYS at 4:00 p.m.   **DARWIN HALL, ROOM 108**   **COFFEE at 3:30 p.m.**

SEPT. 16

GHOSTS OF DEPARTED QUANTITIES RESURRECTED
Professor Norman Feldman, Department of Mathematics, California State College, Sonoma, will discuss a surprising development in mathematics which yields a foundation for calculus in which arguments involving infinitesimals and infinite numbers are mathematically correct.

SEPT. 23

THE ORIGINS OF THE ELECTRONIC DIGITAL COMPUTER
Professor Henry S. Tropp, Department of Mathematics, Humboldt State University, will discuss the early developments in this area, including the relay and electro-mechanical machines of Stibitz and Aiken, ENIAC and the von Neumann Princeton Machine and their progeny.

SEPT. 30

AWARD-WINNING FILM
This striking film describes the achievements of the late, great John von Neuman. This is at times a stirring film and at all times an interesting one.

OCT. 7

CUTTING UP SPACE
Professor G. L. Alexanderson, Chairman of the Mathematics Department at the University of Santa Clara, will discuss the many appearances of Pascal's Triangle in problems of partitioning space. Some discussion of Euler's Theorem in such problems will also be given.

OCT. 14

THE 4 COLOR PROBLEM
Professor John Mitchem, Department of Mathematics, California State University, San Jose, will discuss the history and the very recent [Summer 1976] solution of this most famous unsolved mathematical problem.

OCT. 21

INVERTIBLE POLYNOMIAL MAPS
Professor David Meredith, Department of Mathematics, San Francisco State University, will introduce and discuss one of the unsolved elementary problems of modern mathematics. The apparent simplicity of this problem has made its lack of solution a scandal.

OCT. 28

MULTIPLE TRANSITIVITY IN PERMUTATION GROUPS
Professor Russell Merris, Department of Mathematics, California State University, Hayward, will give an elementary discussion of a simple criterion for determining whether a given permutation group is n-fold transitive. All the necessary definitions will evolve during the talk.

NOV. 4

DIVIDE AND CONQUER
Professor Frederick Luttmann, Department of Mathematics, California State College, Sonoma, will discuss some topics from the Theory of Warfare including the proof that "divide and conquer" is a good strategy. Actual incidents from history, including Nelson at Trafalgar, will be presented.

NOV. 11

PATTERNS IN MATHEMATICS
Professor Karl Smith, Chairman of the Mathematics Department at Santa Rosa Junior College, will consider some problems which can be solved by discovering an appropriate pattern. The talk will emphasize the beauty of patterns rather than the nature of proof.

NOV. 18

OPTIMAL INVESTMENT UNDER RISK
Professor Dan Gallin, Department of Mathematics, University of San Francisco, will show how a problem in portfolio selection can be solved using probability theory and linear programming. This problem assumes a fixed amount of money is to be allocated among different investment opportunities.

DEC. 2

A MATHEMATICAL STUDY OF FRIEZE DESIGNS
Professor William Fisher, Department of Mathematics, California State University, Chico, will examine all the different designs that can be put between two parallel lines and will show that, surprisingly, there are really not very many.

DEC. 9

DEGREE SEQUENCES OF GRAPHS
Professor Robert Johnson, Department of Mathematics, California State College, Sonoma, will explore the relationship between the degrees of the vertices of a graph and the structure of the graph. A survey of pertinent results will be given starting with those of Euler.

THE MATHEMATICS DEPARTMENT OF SONOMA STATE COLLEGE

PRESENTS A SERIES OF LECTURES AND DISCUSSIONS

M·A·T·H

COLLOQUIUM

SPRING 1977   SIXTH SERIES

Tuesdays at 4:00 p.m.   Darwin 108   Coffee at 3:30 p.m.

FEB 17

MATHEMATICS AND MEDICAL DIAGNOSIS
Mr. Henry Swan, Medical Information Systems Consultant, will present a general survey of results and lines of approach developed for mathematical prediction in medical diagnosis.

FEB 24

CATASTROPHE THEORY
Mr. Sumner Stone, M.A. Candidate in Mathematics, Sonoma State College, will describe a new system for constructing mathematical models of such diverse matters as the stock market, the human heartbeat and nerve impulse, dog bites, insect infestations, and war.

MAR 3

MATHEMATICS AND THE MATHEMATICIAN IN INDUSTRY
Dr. Leonard Tornheim, Senior Research Associate, Chevron Research Company, will discuss the work of a mathematician and the nature of mathematics in an industrial environment. Many examples will be given including one involving linear programming.

MAR 10

THE "COUNT" OF MONTE CARLO
Professor Milton H. Hoehn, Department of Mathematics, Santa Rosa Junior College, will investigate some geometric problems with simple Monte Carlo [probability] methods using coin-tossing, pebble-throwing, and random numbers.

MAR 17

IRREDUCIBILITY OF POLYNOMIALS WITH INTEGRAL COEFFICIENTS
Professor Gerald C. Preston, Department of Mathematics, San José State University, will discuss the problem of whether a polynomial can be factored and will consider the few "well-known" results as well as a recent not so well-known result in this area.

MAR 24

CONGRUENCE IN GEOMETRY
Professor Gerald Farrell, Department of Mathematics, California Polytechnic State University, San Luis Obispo, will present a discussion of both elementary and advanced notions of congruence in one, two, and three dimensions, including some examples that contradict our intuitions.

MAR 31

COUNTABLE CONNECTED HAUSDORFF SPACES
Professor Eldon Vought, Department of Mathematics, California State University, Chico, will give a complete history of an elementary area in topology with numerous illustrations and examples [but no proofs].

APR 14

WHAT IS INFORMATION THEORY?
Professor Clement E. Falbo, Department of Mathematics, Sonoma State College, will present a discussion of the most elementary aspects of information theory including some examples of the types of problems that can be solved.

APR 21

GEOMETRIC ADVENTURES
Professor Jean J. Pedersen, Department of Mathematics, University of Santa Clara, will discuss some interesting aspects of polyhedra [three-dimensional geometry].

APR 28

GRAPHICAL COMPARISONS OF POPULATIONS
Professor Kjell Doksum, Department of Statistics, University of California, Berkeley, will review some statistical methods of comparing populations and will introduce some new graphical techniques along with applications to radiation data.

MAY 3

LINEAR 2-NORMED SPACES
Sister Rose Eleanor Ehret, Department of Mathematics, Holy Names College, will give a brief background of the development of this relatively new breed in mathematics along with definitions, discussion, and reference to on-going research.

MAY 12

NON-STANDARD MODELS IN ALGEBRA
Professor Lenore Blum, Department of Mathematics, Mills College, will present a look at how various different results in algebra [e.g. the Hilbert Nullstellensatz, Hilbert's 17th Problem, and the Artin Congecture (a.e.)] are all consequences of the same powerful tool of model theory, namely the transfer principle.

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COLLOQUIUM

THE MATHEMATICS DEPARTMENT OF SONOMA STATE COLLEGE

PRESENTS A SERIES OF INFORMAL TALKS OPEN TO THE PUBLIC

Thursdays at 4 p.m.   Darwin Hall, rm. 108   Coffee at 3:30 p.m.

SEPT 15   **A PACKAGE OF PEARLS**
Professor Hal Andersen, Mathematics Department, Santa Rosa Junior College, will discuss a selection of charming problems from all levels of mathematics that have unusual and creative solutions.

SEPT 22   **MATHEMATICAL RELATIONSHIPS IN MANAGEMENT FORECASTING AND PLANNING**
Dr. Michael Baldigo, Management Department, Sonoma State College, will discuss the role of mathematical models in management decision making, optimization, information processing, and industrial process control; he will also discuss venture analysis, budgeting, simulation, and his work in Marketing Research for I.B.M.

SEPT 29   **A UNIFIED TREATMENT OF SOME MEANS OF CLASSICAL ANALYSIS**
Dr. Joel L. Brenner, Palo Alto, Society for Industrial and Applied Mathematics, will give an elementary presentation on average values, including the arithmetic and geometric means known to Euclid, the Maclaurin intercalation, the polynomial means of Hölder, Muirhead, Beckenbach, and Dresher, and the inequalities that are known to hold among these means.

OCT 6   **SHEDDING LIGHT ON THE CONICS**
Professor Tania Volhontseff, Mathematics Department, Santa Rosa Junior College, will give a brief history of the conics followed by a colorful display of them and their obscure relatives produced by projecting slides on a string model. This will be an enchanting 3-D light show!

OCT 13   **MATHPERSONS: WOMEN IN MATHEMATICS**
Sister Madeleine Rose, Mathematics Department, Holy Names College, will talk about some women who dispelled the myth that mathematics is exclusively a man's subject -- their lives and their work, their difficulties and their triumphs.

OCT 20   **SOME LINGUISTICS IN TERMS OF SET THEORY**
Dr. Karel L. de Bouvere, Mathematics Department, University of Santa Clara, will present a sample of how some simple linguistic problems can be approached by mathematical methods.

OCT 27   **THE EXTRAORDINARY POINTS OF A TRIANGLE**
Brother L. Raphael, Mathematics Department, Saint Mary's College, will present an exposé of the much neglected subject of special points of a triangle, such as circumcentre, isogonal centre, spieker point, fuhrmann point, etc., and will demonstrate that there are too many of these special points!

NOV 3   **WHEN IS $\pi \neq \pi$?**
Dr. G. D. Chakerian, Mathematics Department, University of California, Davis, will discuss properties of the geometry of the Minkowski plane, where lines are lines, but circles aren't circles.

NOV 10   **WHAT'S SO SPECIAL ABOUT ANTIPODAL POINTS?**
Dr. Max K. Agoston, Mathematics Department, San José State University, will first discuss some results related to the Borsuk antipode theorem and their applications, such as the ham sandwich theorem, and then indicate how these results generalize.

NOV 17   **SIMILITUDE IN APPLIED MATHEMATICS AND MECHANICS**
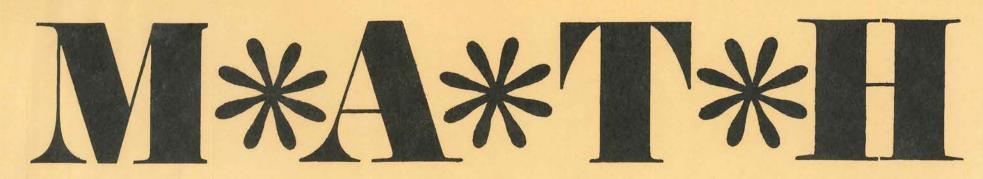Dr. Milton Van Dyke, Division of Applied Mechanics, Stanford University, will discuss several interesting ideas in engineering related to change of scale such as dimensional analysis, symmetry and self-similar solutions, and modeling in fluid mechanics.

DEC 1   **THE PUTNAM COMPETITION**
Dr. Frederick W. Luttmann, Mathematics Department, Sonoma State College, will describe some of the most tantalizing problems from the last ten Putnam Exams, the world's most challenging puzzle contest; the 1977 Exam takes place two days after this talk.

DEC 8   **UNDERGRADUATE MATHEMATICS APPLICATIONS PROJECT (UMAP)**
Dr. Carroll O. Wilde, Mathematics Department, Naval Postgraduate School, will discuss a new program he is involved in to prepare and disseminate materials to undergraduates on the applications of mathematics in other fields.

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THE MATHEMATICS DEPARTMENT OF SONOMA STATE COLLEGE

PRESENTS A SERIES OF INFORMAL TALKS OPEN TO THE PUBLIC

Thursdays at 4 p.m.   Darwin Hall, rm. 108   Coffee at 3:30 p.m.

FEB 16 SPATIAL DISTRIBUTION
Dr. Howard B. Stauffer, Mathematics Department, California State University, Hayward, and Pacific Forest Research Center, Victoria, B.C., will survey methods of testing spatial distributions for randomness, regularity, and clustering, and describe applications to land and forest surveys in British Columbia.

FEB 23 EULER, FERMAT, AND THE NINE-POINT CIRCLE
Dr. Harold D. Taylor, Hillsdale High School, San Mateo, will develop the geometry of the Euler Line, the Fermat Point, and their relation to the classic nine-point circle.

MARCH 2 ECONOMICS AND MATHEMATICS: A Marriage of Love or Convenience?
Dr. Gerald V. Egerer, Economics Department, Sonoma State College, will expand on the following report: "After cohabiting for more than 80 years, a marriage took place in the early 1950's. In spite of the resulting strain to both parties, the subsequent co-mingling of their property now makes divorce undesirable and separation infeasible."

MARCH 9 NEW FRONTIERS IN CRYPTOGRAPHY
Mr. Whitfield Diffie, Electrical Engineering, Stanford University, will survey two problems: the problem of secure communication between parties who have had no prior contact, and the closely related problem of providing signatures for data transmitted in digital form.

MARCH 16 MATHEMATICAL MODELING IN ECOLOGY AND NATURAL RESOURCE MANAGEMENT
Dr. Robert McKelvey, Department of Mathematics, University of Montana, will talk about the art of building mathematical models, and their relevance to environmental policy issues.

MARCH 30 APPROXIMATION OF FUNCTIONS
Dr. Clement E. Falbo, Mathematics Department, Sonoma State College, will discuss interpolation, function spaces, norms and error, Legendre Polynomials, Hermite Interpolates, and spline functions.

APRIL 6 A SURVEY OF THE N-BODY PROBLEM
Dr. Charles Marut, Mathematics Department, California State University, Hayward, will discuss the classic problem of determining the motions of n-bodies in space. Although the problem is still unsolved, some of the properties of the motions can be discovered by using simple mathematics.

APRIL 13 CONVEX POLYTOPES—FIVE EASY QUESTIONS (WITH VERY HARD ANSWERS)
Dr. David Barnette, Mathematics Department, University of California, Davis, will talk about research in the field of convex polytopes. Some easily understood unsolved problems will be presented as well as some remarks on recent progress on related problems.

APRIL 20 MATHEMATICAL MODELING FOR CONTROLLED GROWTH
Mr. Dean Westerfield, mathematics and economics student, Sonoma State College, will describe his research for Sonoma County on a new concept called Transferable Development Units, an idea which seeks to use economic forces to make growth and development more orderly.

APRIL 27 MATHEMATICAL LINGUISTICS AND RECOGNIZING MACHINES
Dr. Howard Swann, Mathematics Department, San José State University, will describe mathematical linguistics, first formalized by Noam Chomsky, and show how to construct a machine that recognizes sentences produced by a simple grammar.

MAY 4 MATHEMATICAL MODELING IN ECOLOGY--SOME PROBLEMS
Dr. Allan Oaten, Biology Department, University of California, Santa Barbara, will talk generally about kinds of models, difficulties, and potential uses. Then he will discuss in more detail some particular examples that are still "open questions".

MAY 11 NON-STANDARD MODELS IN ALGEBRA
Professor Lenore Blum, Mathematics Department, Mills College, will present a look at how various different results in algebra [e.g. the Hilbert Nullstellensatz, Hilbert's 17th Problem, and the Artin Congecture (a.e.)] are all consequences of the same powerful tool of model theory, namely the transfer principle.

MAY 18 EXTREME VALUES BY THE GRADIENT METHOD
Dr. Frank Faulkner, Mathematics Department, U.S. Naval Postgraduate School, will show students with knowledge of calculus how to solve maximum/minimum problems with constraints, using the vector concept of gradients.

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PRESENTS A SERIES OF INFORMAL TALKS OPEN TO THE PUBLIC

Thursdays at 4 p.m.   **Darwin Hall, rm. 112**   **Coffee at 3:30 p.m.**

SEP 14   **FIBONACCI NUMBERS -- Something Old, Something New**
Professor Verner E. Hoggatt, Jr., Mathematics Department, San José State University, and Co-Editor of "The Fibonacci Quarterly", will discuss definitions and simple properties of Fibonacci and Lucas numbers (including some discovered since 1960), and where they occur in Nature.

SEP 21   **SOME PROBLEMS IN ELEMENTARY NUMBER THEORY**
Dr. Hugh M. Edgar, Mathematics Department, San José State University will give examples of easily understood problems requiring a minimum of formal equipment (counterbalanced by a need for ingenuity!).

SEP 28   **THE BRICK-STACKING PROBLEM**
Professor Wally Etterbeek, Mathematics Department, C.S.U. Sacramento, will discuss the following problems: if bricks are stacked in a vertical pile one on top of another without mortar, what is the maximum distance the top brick can extend over the bottom one while keeping the pile in equilibrium? The surprising answer suggests interesting infinite-series considerations.

OCT 5   **A LIFE IN MATHEMATICS**
Dr. Angus E. Taylor, Professor Emeritus of Mathematics, U.C.L.A. and U.C. Berkeley, Chancellor Emeritus, UC, Santa Cruz, and author of well known textbooks in Advanced Calculus, Functional Analysis, etc., will reminisce about his teachers and his experiences in mathematics as a student, faculty member, research mathematician, and author.

OCT 12   **TIDY DRAWINGS OF TREES**
Dr. Charles Wetherell, Department of Applied Science, U.C. Davis, will make a computer draw pretty pictures of the trees which often appear in computer problems and mathematical theorems, and will show how it may be possible to draw planar graphs neatly using the same algorithms.

OCT 19   **MOST CONTINUOUS FUNCTIONS ARE NOT DIFFERENTIABLE**
Dr. Arthur Simon, Chair, Mathematics Department, C.S.U. Hayward, will show that the set of all functions which are differentiable at even a single point is a very sparse subset of the space of all continuous functions on an interval.

OCT 26   **ESTIMATING THE INCREASE IN SKIN CANCER DUE TO DECREASING STRATOSPHERIC OZONE**
Dr. Elizabeth L. Scott, Statistics Department, U.C. Berkeley, will discuss how large the increase in skin cancer might be due to the depletion by man-made pollutants (airplane exhaust, spray–can propellents) of stratospheric ozone which provides partial protection from ultra-violet radiation.

NOV 2   **THE USE OF GENERATING FUNCTIONS TO DISCOVER AND PROVE PARTITION IDENTITIES**
Dr. Henry L. Alder, Mathematics Department, U.C. Davis, and President of the Mathematical Association of America, will demonstrate opportunities for undergraduate and advanced high school students to engage in mathematical research; all examples will involve the discovery and proof of some startling partition identities.

NOV 9   **COMPUTER SEARCH BY MEANS OF BRANCH AND BOUND**
Dr. Robert Hooper, Mathematics Department, University of Nevada at Reno, will discuss imaginative uses of integer programming, including applications to nortorious NP complete problems; he will discuss tree search methods used in combinatorial algorithms.

NOV 16   **HOW MANY NUMBERS DO WE REALLY NEED?**
Dr. Lester H. Lange, Dean of the School of Science, San José State University, will look at a certain very sparsely distributed set of rational numbers, which are connected with Pythagoras, to see how much of our work could be done if these were the only numbers we had.

NOV 30   **TECHNIQUES OF SPACE DIVISION IN THE PLANE**
Brother Alfred Brousseau, Mathematics Department, St. Mary's College, will derive a neat formula of the Eulerian type for the number of regions into which a set of lines divides the plane.

DEC 7   **THE WORK OF ALAN BAKER, FIELDS MEDALIST**
Professor Roy Ryden, Mathematics Department, Humboldt State University, recently returned from a sabbatical at the Institute for the History and Philosophy of Science and Technology at the University of Toronto, will talk about one of the recipients of the Fields Medal, the "Nobel Prize of Mathematics"

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COLLOQUIUM

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

Wednesdays at 3:00 p.m.   **Darwin Hall, Room 112**   **Coffee at 2:30 p.m.**

FEB 21 **52 THINGS TO REMEMBER WHEN PLAYING BLACKJACK**
Professor Peter A. Griffin of the Department of Mathematics, Sacramento State University, will explain the "spectrum of opportunity" which arises when more than one hand is played without reshuffling the pack of cards, and will also give an account of different multivariate statistical methods used to quantify and improve what are called "card-counting methods."

FEB 28 **WHAT ACTUARIES ACTUALLY DO**
Mr. Nick Franceschine of the Wyatt Co. of San Francisco, a 1978 Sonoma State University M.A. graduate in mathematics, will discuss his experiences as a frustrated number theorist doing pension actuarial work, and describe the exciting employment possibilities in this field.

MARCH 7 **CONTINUED FRACTIONS AND THEIR INFORMATION RATE**
Dr. Nelson M. Blachman, Senior Scientist at the GTE Sylvania Electronic Systems Group, Mountain View, will introduce the continued-fraction representation of positive numbers and will show that each digit (which can be any positive integer) conveys, on the average, only 3% more information than a digit of the decimal representation.

MARCH 14 **FUN WITH CONTINUED FRACTIONS**
Dr. Clement E. Falbo of the Department of Mathematics, Sonoma State University, will conduct a tour through periodic continued fractions that leads from a calculator game to extremal problems involving quadratic and cubic equations.

MARCH 21 **THE THEORY OF BOOLEAN ALGEBRAS FROM A LOGICIAN'S POINT OF VIEW**
Professor Steve Givant of the Department of Mathematics and Computer Science, Mills College, Oakland, will discuss the origins of Boolean algebras, their relationship to logic and set theory, and metamathematical problems such as axiomatizability, decidability, completeness, and representation problems.

MARCH 28 **SHORTEST ROUTES AND CHEAPEST TREES**
Dr. Robert H. Johnson of the Department of Mathematics, Sonoma State University, will give several algorithms for the solution of such problems as: How can a trucking company devise a "consistent" rate schedule? How can a rapid transit system be constructed in the most economical manner? The algorithms will be compared for their convenience and economy.

APRIL 4 **WRITING ABOUT MATHEMATICIANS**
Constance Reid of San Francisco, the well-known author of the biographies "Hilbert" (Springer Verlag 1970) and "Courant in Göttingen and New York" (Springer Verlag 1976), will discuss problems unique to writing about mathematicians.

APRIL 11 **SPRING RECESS**

APRIL 18 **WHAT IS AN INDUSTRIAL MATHEMATICIAN?**
Mr. Paul H. Merz of Chevron Research Company, Richmond, will discuss some of the typical problems he's worked on, which illustrate the work of a mathematician in industry.

APRIL 25 **NUMERICAL WEATHER PREDICTION**
Dr. Chris A. Riegel of the Department of Meteorology, San José State University, will discuss the problems of using a computer to generate numerical solutions to the non-linear partial differential equations that model changes in the weather.

MAY 2 **NUMBER THEORY IN CELESTIAL MECHANICS**
Dr. Buck Ware of the Department of Mathematics, Chico State Univeristy, will informally survey some recent applications of number theory to stability of the solar system and to the distribution of asteroids.

MAY 9 **GRAPHICAL REPRESENTATION AND ITS USES IN POLICY SCIENCES**
Dr. Peter C. C. Wang of the Departments of Mathematics and National Security Affairs, Naval Postgraduate School, Monterey, will present some fascinating applications of this branch of mathematics by examining the Soviet penetration into sub-Sahara Africa.

MAY 16 **THE GAMMA FUNCTION**
Dr. Joe S. Tenn of the Department of Physics and Astronomy, Sonoma State University, will define this famous and useful function, show its relation to factorials, and then use it to derive the volumes and surface areas of spheres in n-dimensional space.

Sonoma State University