Undergraduate Mathematics Day   Math Events

2009

2009 Program and Abstracts,

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Undergraduate Mathematics Day

at the

University of Dayton

Saturday November 7, 2009

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PROGRAM

8:45 - 9:30	Check-in, folder pick-up, refreshments	Science Center Auditorium Lobby
9:30 - 9:45	Welcome: **Megan Miller** Vice President, Math Club University of Dayton	Science Center Auditorium
9:45 – 10:45	Invited Address: **Kristin Duncan** San Diego State University **Keeping Up-to-Date With Bayes**	Science Center Auditorium
11:00 - 11:55	Contributed Paper Sessions (Part I)	Science Center 114, 146, 150
12:00 - 1:00	Lunch	Science Center Atrium and Science Center Auditorium Lobby
1:00 -1:15	Introduction: Schraut Memorial Lecture **Josh Cain** President, Math Club University of Dayton	Science Center Auditorium
1:15 - 2:15	The Tenth Annual Kenneth C. Schraut Memorial Lecture: **Thomas Santner** The Ohio State University **These Aren't Your Mothers and Fathers Experiments**	Science Center Auditorium
2:15 – 2:30	Break with Refreshments	Science Center Auditorium Lobby
2:30 – 3:45	Contributed Paper Sessions (Part II)	Science Center 114, 146, 150, 323

Schedule for Contributed Paper Sessions, Part I

	Science Center 114 Auditorium	Science Center 146	Science Center 150
Moderator	Kara Wurzelbacher	Natalie Leonhardt	Josh Cain
11:00-11:15	**Distance Functions and Attribute Weighting in a k-Nearest Neighbors Classifier with an Ecological Application** Alyssa Frazee, St. Olaf College and Matthew Hathcock, Winona State University	**Stability of Steady State Solutions of the Forced Kuramoto-Sivashinsky (KS) Equation** Miriam Poteet, Air Force Institute of Technology	
11:20-11:35	**The Coloring Game on Certain Outerplanar Graphs** Charles Suer, University of Dayton	**Solving a System of Fuzzy Linear Equations** Nasrin Sultana, University of Dayton	**The Physics of Physical Abuse** Ernest L Mitchell, Wright State University
11:40-11:55	**Balanced Perfect Sequences of Period 38 and 50** Zachary Little, Wright State University	**Effect of Stress on Neurotransmitter** Nabil Ali and Chiedozie Onianwa, Central State University	**Stochastic Modeling and Analysis of Unemployment** Hayley Belli, University of Oregon

Schedule for Contributed Paper Sessions, Part II

	Science Center 114 Auditorium	Science Center 146	Science Center 150	Science Center 323
Moderator	Hayley Belli	Marie Nicole Dailey	Charles Suer	Nabil Ali
2:30-2:45	**Cayley Graphs for Dihedral Group, Alternating Group, and Semi-Direct Products** Matthew P. Magner, University of Dayton	**Uniqueness of Solutions Implies Existence of Solutions** Veronica Respress, Wilberforce University	**A Groebner Basis Approach to Number Puzzles** Alex A. Griffith, Wittenberg University	**Multilevel Hadamard Matrices** Keli S. Parker, Wright State University
2:50-3:05	**Entropy Optimal Orthogonal Matrices** Ramya Ramachandran Janaki, Wright State University	**The Marshall Differential Analyzer Project: A Physical Interpretation of Mathematics** Richard P. Merritt and Devon A Tivener, Marshall University	**Taking Flatland to the Limit** Robert Short, John Carroll University	**Using Counting Methods to Prove Relations in Pascal's Triangle** Joshua S. Cain, University of Dayton
3:10-3:25	**The Maximum Induced Matching Problem for Some Subclasses of Weakly Chordal Graphs** Chandra Mohan Krishnamurthy, University of Dayton	**The Economic Dynamics of Financial Crisis** Qian Li, University of Dayton	**The Lost Calculator** Abby Berthold, Natalie Leonhardt and Katie O'Brien, University of Dayton	
3:30-3:45	**A Survey of Group Weighing Matrices** Jeff R. Hollon, Wright State University	**Just Sit Back and Let the Girth Model Make Money for You** Elham Negahdary, University of Dayton	**Approximations Using Greek Ladders** Ben Pleasanton, US Air Force Academy	

Invited talks
Science Center Auditorium

Kristin Duncan, San Diego State University
Keeping Up-to-Date With Bayes

Abstract: Bayes' theorem, a rule for updating probabilities as new information is obtained, may be over two centuries old but it has been the driving force behind many of the most significant recent advances in statistics and other sciences. In this talk we will review Bayes' theorem and the evolution of Bayesian inference. The talk will touch on the philosophical differences between Bayesians and frequentists which caused controversy and heated debate in the statistics community for years. We will illustrate how Bayesian methods can be applied to analyzing criminal evidence, determining the best way to conduct clinical trials, and developing more useful software.

Dr. Duncan, who received her B.S. (1999) from the University of Dayton and her Ph.D. (2004) from The Ohio State University is a faculty member in the Department of Mathematics and Statistics at San Diego State University. Her research interests are in Bayesian models, item response models, and survey methodology.

1:15 – 2:25 p.m.   ## The Tenth Kenneth C. Schraut Memorial Lecture
Thomas Santner, The Ohio State University
These Aren't Your Mothers and Fathers Experiments

Abstract: Informal experimentation is as old as humankind. Statisticians became seriously involved in the conduct of experiments during the early 1900s when they devised methods for the design of efficient field trials to improve agricultural yields. During the 1900s statistical methodology was developed for many complicated sampling settings and a wide variety of design objectives. For example, Taguchi emphasized designing experiments for the goal of creating "robust product designs," i.e., products whose performance was as impervious as possible to variability in the constituent components of the final product. Within the last 15 years experimentation has been heavily influenced by high speed computing and developments in numerical algorithms. The starting place for this computational influence is the work of applied mathematicians who have created sophisticated theoretical models of the input-output relationships of many engineering and biological systems. The implementations of such models in computer codes are routinely used as surrogates (or adjuncts) for physical experiments. This use of a computer code is often termed a "computer experiment." Automobiles, airplanes, and prosthetic devices are but a few of the many products whose development relies heavily on computer experiments. This talk will describe the breadth of applications of computer experiments and sketch the framework used to think about the analysis of data from them. We will also give some (unsolicited) advice about graduate school and life beyond the undergraduate degree.

Professor Santner, who received his B.S. (1969) from the University of Dayton and his M.S. (1971) and Ph.D. (1973) from Purdue University is a Professor in the Department of Statistics at The Ohio State University. Professor Santner was a member of the faculty at Cornell University from 1973-1989 before joining the faculty at the Ohio State University in 1990. He served as chair of the Department of Statistics during 1992-2000 and he is also a former Director of the Department's Statistical Consulting Service. He currently serves as chair of the Department of Biostatistics in the Ohio State University College of Public Health. He has held various visiting positions including a position as a Fulbright Scholar at Ludwig Maximilians Universität in Munich, Germany, and visiting positions at Cornell University and Duke University.

Professor Santner's research interests are in the design of experiments and the analysis of discrete data. He is the co-author of three books, The Statistical Analysis of Discrete Data (with Diane Duffy), Springer-Verlag, Inc. (1989), Design and Analysis of Experiments for Statistical Selection, Screening, and Multiple Comparisons (with R. E. Bechhofer and D. M. Goldsman), J. Wiley and Sons (1995), and The Design and Analysis of Computer Experiments (with Brian Williams and Bill Notz), Springer-Verlag, Inc. (2003).

Abstracts of contributed paper sessions

Contributed Paper Sessions, Part I, 11:00 – 11:55 a.m.

11:00 – 11:15 a.m.

SC 114 **Distance Functions and Attribute Weighting in a k-Nearest Neighbors Classifier with an Ecological Application,** Alyssa Frazee, St. Olaf College and Matthew Hathcock, Winona State University

Abstract: To assess environmental health of a stream, field, or other ecological "object," characteristics of that object should be compared to a set of reference objects known to be healthy. Using streams as "objects," we propose a k-nearest neighbors algorithm (Bates Prins and Smith, 2006) to find the appropriate set of reference streams to use as a comparison set for any given test stream. Previously, investigations of the k-nearest neighbors algorithm have utilized a variety of distance functions, the best of which has been the Interpolated Value Difference Metric (IVDM), proposed by Wilson and Martinez (1997). We propose two alternatives to the IVDM: Wilson and Martinez's Windowed Value Difference Metric (WVDM) and the Density-Based Value Difference Metric (DBVDM), developed by Wojna (2005). We extend the WVDM and DBVDM to handle continuous response variables and compare these distance measures to the IVDM within the ecological k-nearest neighbors context. Additionally, we compared two existing attribute weighting schemes (Wojna 2005) when applied to the IVDM, WVDM, and DBVDM, and we propose a new attribute weighting method for use with these distance functions as well. In assessing environmental impairment, the WVDM and DBVDM were slight improvements over the IVDM. Attribute weighting also increased the effectiveness of the k-nearest neighbors algorithm in this ecological setting.

SC 146 **Stability of Steady State Solutions of the Forced Kuramoto-Sivashinsky (KS) Equation,** Miriam Poteet, Air Force Institute of Technology

Abstract: The Kuramoto-Sivashinsky equation was first introduced by Kuramoto in 1976 as an application to the study of phase turbulence in the Belousov-Zhabotinsky reaction, a classic example of non-equilibrium thermodynamics which results in the establishment of a nonlinear chemical oscillator. Sivashinsky, independent of Kuramoto, developed this equation to model flame fronts. The KS-equation also has application to the study of viscous fluids and nonlinear long waves in viscous-elastic tubes. In this work, we consider the damped, externally excited Kuramoto-Sivashinsky (KS) type equation and employ an asymptotic perturbation method to obtain two slow flow equations on amplitude and phase to obtain steady state solutions. We shall analyze the stability of the steady state solutions.

11:20 – 11:35 a.m.

SC 114 **The Coloring Game on Certain Outerplanar Graphs,** Cassandra Naymie, University of Waterloo, Erin Pitney, Beaverton School District, Charles Suer, University of Dayton

Abstract: Graph coloring games have been studied quite extensively, but there are still many unsolved problems. In this paper we discuss an activation strategy for Alice to use on a certain subclass of outerplanar graphs. Using this strategy, we prove that for all graphs in this subclass, $\chi_g(G) \leq 6$, and $\chi_g^{(2)}(G) \leq 3$, where $\chi_g(G)$ is the least number of colors needed such that Alice has a winning strategy in the original coloring game and $\chi_g^{(2)}(G)$ is the corresponding number for the 2-clique relaxed coloring game. We also outline many potential strategies for the 2-clique relaxed game on outerplanar graphs.

SC 146 **Solving a System of Fuzzy Linear Equations,** Nasrin Sultana, University of Dayton

Abstract: In this paper, we investigate the solution of a system of fuzzy linear equations, Ax=b, where A is a crisp real $n \times n$ matrix and b is a vector consisting of n trapezoidal fuzzy numbers. Assuming that the unknown vector x is a fuzzy number vector of the same type as b, and defining the addition and scalar-multiplication by Zadeh's extension

principle, we propose a method of solution that replaces the n×n fuzzy system by a 4n×4n crisp linear system MX=B, where M is a block symmetric matrix which depends on A, and B is a vector whose components are rearranged parameters of the fuzzy numbers in b. We provide conditions for the existence of a unique fuzzy solution of the system under investigation. We use the MATHEMATICA for symbolic and numeric computation.

SC 150   The Physics of Physical Abuse, Ernest L Mitchell, Wright State University

Abstract: Physical abuse is the intentional use of violence against a person to achieve an abuser's goal. The buracracy in prosecuting those who have committed acts of violence against: women, children, and the elderly, had increased due to enviromental pressures in our changing society. The system is often overloaded with cases of physical abuse, especially in the Child Protective Services, where victims in desperate need of help fall through the pit of buracracy. This presentation is a argument on how we can alieviate the issue of case back-logs using Analytic Mechanics. We are going to explore the chaos of physical abuse using an energy consideration of Work-Kinetic Energy Theorem: T = -delta(U) From this, we can find T (kinetic energy) of the assault using differential equations and finding a probability of severe injury or death be comparing T to the total energy E. This presentation will show cases in which certain scenerios can be applied and applications in criminal justice in speeding up the process in convicting the accused and freeing the innocent.

11:40 – 11:55 a.m.

SC 114   Balanced Perfect Sequences of Period 38 and 50, Zachary Little, Wright State University

Abstract: We provide an overview of the known families of perfect binary sequences of period 2 (mod 4). We present previously unknown examples of balanced perfect binary sequences of period 38 and 50, due to computer results.

SC 146   Effect of Stress on Neurotransmitter, Nabil Ali, Central State University and Chiedozie Onianwa, Central State University

Abstract: The basic components of a neuron (brain cell) are axon and dendrite. Axon is sending information and dendrite is receiving the information. The communication between different neurons is carried out via neurotransmitter (N_T). The present study is based upon the dynamics of these N_T. A mathematical model has been constructed to understand the complex mechanism. The main objective of this research is to understand the effect of STRESS on the dynamics of this complex mechanism of communication. Model analysis has been performed with the help computer simulation and reported data.

SC 150   Stochastic Modeling and Analysis of Unemployment, Hayley Belli, University of Oregon

Abstract: The question of how to accurately model volatile economic and financial data is a common problem proposed by applied mathematicians. In this paper, methods for mathematically modeling U.S. unemployment rates are analyzed and explored. To better understand the dynamics of the unemployment process, correlations between unemployment and other economic time series are calculated, with the discovery of a significant relationship between unemployment and two-year-prior interest rates. Additionally, the cyclical pattern between documented U.S. recessions and spikes in unemployment data suggests that a Poisson process could be used for modeling recession frequency, and therefore, the timing of future unemployment peaks. The focus of the paper then turns to the creation of a discrete-state Markov chain model, which assigns probabilities to the transactions between high, low, increasing, and decreasing states of unemployment. Within each state, unemployment follows a specific dynamic that suggests using a parameterized arithmetic Brownian motion process. This model uses stochastic simulation to provide the basis for 25-year projections of future unemployment rate scenarios.

Contributed Paper Sessions, Part II, 2:30 – 3:45 p.m.

2:30 – 2:45 p.m.

SC 114   **Cayley Graphs for Dihedral Group, Alternating Group, and Semi-Direct Products,** Matthew P. Magner, University of Dayton

Abstract: A group is a set of elements with a binary operation that follows a certain set of axioms. A Cayley graph is a graph that corresponds to a group and a generating set of the group. Lovasz conjectured that every Cayley graph contains a Hamiltonian cycle. The Hamiltonian cycle can easily be found for Cayley graphs of abelian groups. Cayley graphs for simple, non-abelian groups tend to have some patterns among them, particularly graphs of the Dihedral group, and the Alternating group.

SC 146   **Uniqueness of Solutions Implies Existence of Solutions,** Veronica Respress, Wilberforce University

Abstract: In this paper we are concerned with uniqueness implies uniqueness and uniqueness implies existence questions for solutions of a class of boundary value problems for the third order ordinary differential equation (ODE). Specifically, we are utilizing the class of boundary value problems for the third-order ordinary differential equation and three boundary conditions at either two or three boundary points. First we set out to determine whether uniqueness of solutions of a class of two-point problems implies the uniqueness of solutions of an associated class of three-point problems. Following that, we then establish that uniqueness of solutions of the third-order ODE satisfying two-point problems will imply the existence of solutions of the third-order ODE satisfying two-point problems. Finally, we show that uniqueness of solutions of the third-order ODE satisfying two-point problems will imply the existence of solutions of the third-order ODE satisfying three-point problems.

SC 150   **A Groebner Basis Approach to Number Puzzles,** Alex A. Griffith, Wittenberg University

Abstract: In this talk we illustrate how number puzzles can be described as systems of polynomials, and how these polynomials can help us find and count solutions. To do this, we use Buchberger's Algorithm to compute Groebner Bases. We begin by outlining a program we wrote to solve specific KenKen puzzles and then present a technique for counting the number of possible distinct puzzle boards for Latin Squares and Sudokus. We also outline a method for giving an upper bound to the number of distinct boards when finding a complete Groebner Basis is not computationally feasible.

SC 323   **Multilevel Hadamard Matrices,** Keli S. Parker, Wright State University

Abstract: Multilevel Hadamard matrices (MHMs) are of interest for their wide array of applications such as error control coding and CDMA systems. Sarah Adams et. al. have proven the existence as well as a method of construction for MHMs of all orders. We give some new examples for circulant full-rate MHMs of orders 5 and 6 that do not follow from the Adams construction, yet still satisfy the definition.

2:50 – 3:05 p.m.

SC 114   **Entropy Optimal Orthogonal Matrices,** Ramya Ramachandran Janaki, Wright State University

Abstract: Entropy optimal matrices for three and five dimensions were known earlier (Paper: Entropy and Hadamard matrices.) We present examples for dimensions 6 and 10 that arise from "critical points". While we are unable to prove the optimality, we believe that our scheme would give rise to a family of such matrices.

SC 146   **The Marshall Differential Analyzer Project: A Physical Interpretation of Mathematics,** Richard P. Merritt, Marshall University and Devon A Tivener, Marshall University

Abstract: Mechanical integration is an idea dating back to the late 1800's discovered by James Thomson, brother of Lord Kelvin. This idea was then expanded to build a calculating machine, called a differential analyzer, by Vannevar Bush (M.I.T) in 1929. The Marshall University Differential Analyzer Team has followed in the footsteps of Dr. Bush and a gentleman named Dr. Arthur Porter, who was the first to build a differential analyzer in England when he was a student of Dr. Douglas Hartree. He built his machine of Meccano components, the British version of Erector Set. In the early days of Arthur Porter's research, the machine was used to solve ordinary differential equations and the results were compared to those of more sophisticated differential analyzers of that time. Dr. Porter's research proved that the Meccano differential analyzer was well suited for many dynamical systems applications. The Marshall University Differential Analyzer Team has recently constructed the only two publicly accessible differential analyzers in the USA, a mini two integrator machine and a larger four integrator machine built in the spirit of the Porter Meccano Manchester Differential Analyzer. They are continuing in the spirit of Dr. Porter's work. However, their comparisons will concern digitally computed solutions using numerical methods for approximations. In this presentation the Team will give an overview of the Marshall Differential Analyzer Project, the mechanics of the machine and the mathematics that can be described by the mechanics. The mini two integrator differential analyzer (known as Lizzie) will accompany the Team for a live demonstration.

SC 150   **Taking Flatland to the Limit,** Robert Short, John Carroll University

Abstract: Let's look at the geometry within Flatland - the book by Edwin Abbot. We will then examine what happens as we use calculus to take these geometric concepts to their limits.

SC 323   **Using Counting Methods to Prove Relations in Pascal's Triangle,** Joshua S. Cain, University of Dayton

Abstract: Everyone from middle schoolers to mechanical engineers has heard of the numerical array known as Pascal's Triangle, yet most people are unaware of the veritable treasure trove of mathematical significance that hides beneath its deceptively simple construction. This talk highlights the derivations of three sequences in particular (powers of 2, Pascal central numbers, and the Fibonacci Sequence) from the elements of the triangle, and furthermore displays proofs of their existences using binomial coefficients and counting proof techniques.

3:10 – 3:25 p.m.

SC 114   **The Maximum Induced Matching Problem for Some Subclasses of Weakly Chordal Graphs,** Chandra Mohan Krishnamurthy, University of Dayton

Abstract: An induced matching in a graph is a set of edges such that no two edges in the set are joined by any third edge of the graph. An induced matching is maximum (MIM) if the number of edges in it is the largest among all possible induced matchings. It is known that finding the size of MIM in a graph is NP-hard even if the graph is bipartite. It is also known that the size of MIM in a chordal graph or in a weakly chordal graph can be computed in polynomial time. Specifically, the size of MIM can be computed in linear time for a chordal graph and in $O(m^3)$ time for a weakly chordal graph. This work demonstrates some algorithms for the maximum induced matching problem with better complexity than $O(m^3)$ for some subclasses of weakly chordal graphs. The classes of graphs that we consider are either more general than chordal graphs or are a restriction of chordal bipartite graphs.

SC 146   **The Economic Dynamics of Financial Crisis,** Qian Li, University of Dayton

Abstract: The current financial crisis comes from the subprime mortgage woes that occurred in the USA in 2007. Beginning with the failures of large financial institutions in the United States, it rapidly propagated into a global financial and economic crisis. Since the impact of financial crisis on the global economy is dramatic and wide spread, conducting research on the economic dynamics of financial crisis helps us to trace the root of financial crisis. This research studies the economic dynamics of financial crisis, the contagion of economic shocks, and how economic shocks interact with each other during the crisis period. Economic shocks include shocks in the stock market, housing

market, credit market, and commodity market. Empirical evidences are examined at both the aggregate (macro) and individual firm (micro) level. At the macro level, we set up a VAR system in which the interactions of shocks in the stock market, housing market, credit market, and commodity market are examined. Variance decomposition and impulse response analyses offer us better understanding about the path of such shocks and the dynamics that economic system returns to equilibrium. At the micro level, quantile regression models are conducted on a cross-section of stocks to analyze the impact of economic shocks on stock market performance. Quantile regression examines the different responses of equity returns to financial crisis at the tails of the return distribution, and allows us to find factors contribute to good/bad performance during the crisis period.

SC 150   **The Lost Calculator,** Abby Berthold, University of Dayton, Natalie Leonhardt, University of Dayton, and Katie O'Brien, University of Dayton

Abstract: Ancient civilizations used the abacus to perform complex mathematical operations. We will focus on the mental math used in addition and subtraction. The rules and benefits of using an abacus (especially in a classroom) will be outlined and discussed.

3:30 – 3:45 p.m.

SC 114   **A Survey of Group Weighing Matrices,** Jeff R. Hollon, Wright State University

Abstract: A Group Weighing Matrix is a Weighing Matrix with some group acting on it. In this talk the groups are assumed to be abelian. The interest here is whether or not these matrices exist for a given order and weight. We will present properties and known results for the existence of GWMs with orders and weights less than 100Let K_n be a complete graph of order n. Let * denote a Cartesian product. Let I be a maximum independent set in $K_n*K_n*K_n$. A silver cube then is a coloring of all vertices (using 3n-2 colors) in $K_n*K_n*K_n$ such that the closed neighborhood of every vertex in I contains every color precisely once. The problem can be restated visually in a somewhat friendlier way, bearing a slight resemblance to a sudoku puzzle. If two cubes of size a and b exist, then a cube of size ab is constructible. It is an open question whether any silver cubes exist besides those where $n = 2^a 3^b 5^c 7^d$. The factor 7 was discovered this past summer using a method that will be presented in the talk.

SC 146   **Just Sit Back and Let the Girth Model Make Money for You,** Elham Negahdary, University of Dayton

Abstract: The Girth Model will use the 10-period exponential moving average (EMA) and the 20-period EMA as their proxy for market trend. The girth model is a trend-following model incorporating volatility, momentum and velocity. We will use girth as an early close indication to both long and short positions. Typically, early exit due to decreasing girth results in a more favorable profit position than that taken if the trader simply waited for an exit on the EMA cross to the downside.

SC 150   **Approximations Using Greek Ladders,** Ben Pleasanton, US Air Force Academy

Abstract: We investigate generalizations of the classic Greek ladder approximations of various irrationals. We look at ladders for nth roots as well as rational functions.

The Tenth Kenneth C. Schraut Memorial Lecture

The Kenneth C. Schraut Memorial Lecture was established entirely with the generous support of alumni donations in memory of Dr. Kenneth C. Schraut, who was a long-time faculty member and chair of the Department of Mathematics. The Memorial Lecture was established for the purpose of sponsoring invited lectures by noted mathematicians for undergraduate students.

2009   Thomas Santner, The Ohio State University
These Aren't Your Mothers and Fathers Experiments

2008   Robert Bolz, Lockheed Martin Corporation
Leadership Founded in Habits of Inquiry and Reflection

2007   William Dunham, Muhlenberg University
An Euler Trifecta

2006   Gregory Campbell, Food and Drug Administration
The Role of Biostatistics in Medical Devices: Making a Difference in People's Lives Every Day

2005   Patrick Flinn, National Security Agency
Gröbner bases: A Natural Extension of Gaussian Reduction and the Euclidean Algorithm

2004   Jane Pendergast
Beyond Reasonable Doubt: The Role of Statistics in Health Research

2003   Robert E. Lewand, Goucher College
How not to get lost while on a Random Walk

2002   Paul J. Campbell, Beloit College
How to keep up with Mathematics

2001   Richard M. Schoen, Stanford University
Geometry in Two and Three Dimensions

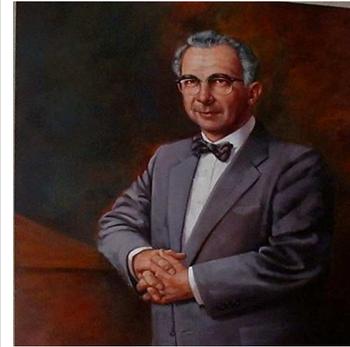2000   Joe Diestel, Kent State University
Sums and Series in Vector Spaces

REMARKS OFFERED AT THE FUNERAL OF DR. KENNETH C. SCHRAUT

November 3, 1997

Prepared and Presented by

Dr. Harold G. Mushenheim

Department of Mathematics, University of Dayton

Family members, relatives, and friends of Doctor Schraut,

When Doc's family requested that someone in the Department say a few words about him at the service, and that that someone might be me, my initial response was to decline. In part, my reluctance arose from the fact that without a piece of chalk, an eraser, and a blackboard to run around in front of, I find public speaking not one of my favorite things. In greater part, though, I believe I hesitated because of the severe boundary condition contained in the phrase "a few words." I realized that rendering even small justice to Doc's accomplishments and life would require much more than that.

My own first encounter with Doc occurred in the early fifties in his office in the Albert Emanuel Library building, when he directed the project which eventually grew into the Research Institute. He had then already been on the campus scene for some twelve years or more. I am sure that most of us here today can recall clearly the circumstances of our first meeting with him. Perhaps, for you, it was as a freshman pre-med or engineering student who, just told--in no uncertain terms--to "mount the sphere, young man," realized only later that Doc was telling you to "get on the ball." Indeed, many of us here can say that our lives would probably be much different today had we not entered into Doc's force field.

His special genius as an educator derived, I think, from the intense personal interest he had in each of his students and in getting them to collaborate with him and each other in the learning process.

In his position as chair of the Mathematics Department, he developed a highly successful program of employing undergraduate teaching assistants. This provided many students with the opportunity of putting their knowledge at the service of others, and, in so doing, of perfecting their own. A disproportionately high percentage of these students were inspired by Doc and this experience to take on the challenge of graduate school and/or a career in mathematics education.

The biennial alumni seminars which he began, and which still flourish, evolved out of this philosophy of passing on to others the educational advantages which one received.

Over the years, Doc was involved in the advising of pre-medical students, and he taught a calculus course specially designed for them. The lecture notes which he generated for this class were in a constant state of development. Revision began immediately upon the completion of each new draft. Again, Doc--as he did in mathematics--brought back to campus many alumni physicians to enrich the education of the current class of pre-meds.

Doc had a strong sense of how the university ought to be run for the good of all, and he did not hesitate to inform those who had need of this knowledge. In all likelihood, at this moment, there are, in many file drawers on campus, examples of what he himself termed "fussing letters," communications directed to right a wrong or set a policy straight.

He loved languages, and once even set himself to learning a bit of Arabic, in order to assist some of our Mid-Eastern students. He had a rich vocabulary and liked to use it, especially in his letters, "fussing" or otherwise. His annual letter to hundreds of alumni and friends was a harbinger of the Christmas season.

Doc possessed an excellent memory and an arsenal of stories, some involving himself and some very funny. I once went with Doc to a mathematics convention in New Orleans. At that time, he was feuding with a certain Father so-and-so about some parish matter. Doc was really looking forward to meeting with his mathematical brethren, getting out of Dayton's January chill, and certainly being out of touch with his nemesis on the homefront. As we were settling our registration business at the hotel desk, I looked up and was startled to see this very Father so-and-so coming out of the elevator. I started to tell Doc not to look in that direction, but it was too late. For the rest of the meeting, Doc was--as he would put it in his own words--"not quite [him]self." Doc liked the Rumpole stories and the television shows based on them. I personally thought this very appropriate, as it seemed to me that there was something of Doc in Rumpole and something Rumpolean about Doc. When, for instance, he would chortle about something that the character "She Who Must Be Obeyed" said or did, I knew that he was speaking affectionately of his own beloved Virginia.

His intelligence and interests were wide and deep. He was in fact a fine woodworker. Examples of his craftsmanship were displayed in a beautiful exhibit of photographs at the funeral home yesterday.

As for all of us, some of the day-to-day circumstances of life moved his spirits. For Doc, having a good secretary lifted them skyward; having a poor one was a source of deep travail.

Even though I did not intend to provide an archival record of Doc's work in these "few words," I must mention his long service to the American Society for Engineering Education and to Honor Seminars of Metropolitan Dayton with which he was associated from its inception. I
have tried, rather, to provide a few strokes of the pen, swiftly drawn, so that each of you can fill in your own portrait of this father, grandfather, teacher, adviser, mentor, colleague,
and friend.

How fitting that the University of Dayton conferred upon Doc the title of Distinguished Service Professor. His life was indeed one of service, truly distinguished.

THANK YOU!

We thank all the speakers and advisors whose emphasis on creating and sharing challenging and fun mathematics contributed to the success of this program. In addition, we wish to gratefully acknowledge the support of the following persons and organizations.

For more information on this conference, contact
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The Electronic Proceedings of Undergraduate Mathematics Day is a refereed electronic journal devoted to providing a publication outlet for talks presented at this conference.
http://academic.udayton.edu/EPUMD/