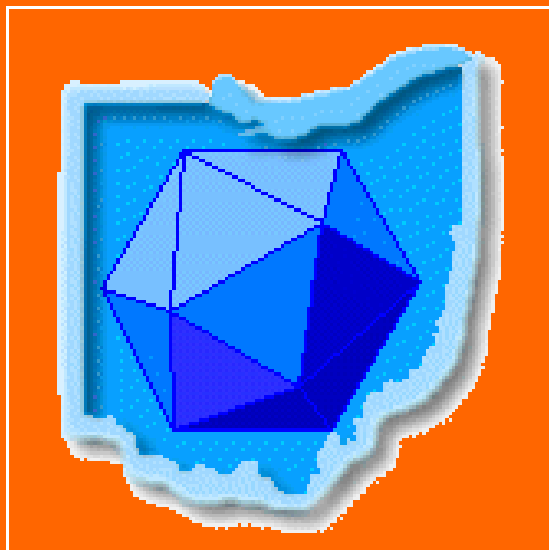Program of Activities
For the Fall Meeting of the

Mathematical Association of America

Ohio Section

Fall 2007
Wittenberg University
Springfield, Ohio
October 26-27, 2007

<div align="center">

MAA Ohio Section
Program

</div>

***Note: All activities will be held in the Kuss Science Center (KSC), except the banquet.**

Friday, October 26, 2007

Noon – 4:30	Registration	*KSC Atrium
1:00 – 4:30	Vender and Book Exhibits	KSC Room 141
12:00 – 1:00	Committee Meetings: 　CONSTUM 　CONCUR 　CONTEAL 　CONSACT	 KSC Room 212 KSC Room 320 KSC Room 327 KSC Room 351
1:15 – 1:30	Welcome and Announcements	KSC Bayley Auditorium
1:30 – 2:30	Invited Address **"Approximating Sums of Infinite Series"** Tom Price, University of Akron	KSC Bayley Auditorium
2:30 – 3:00	Break	
3:00 – 4:00	Invited Address **"Geometry with Complex Numbers "**. Mihai Caragiu, Ohio Northern University	KSC Bayley Auditorium
4:10 – 5:45	**Contributed Papers**	KSC Rooms 262, 319
4:10 – 6:05	Executive Committee Meeting	KSC Room 351
5:45 – 6:30	Social Time	Hollenbeck Hall Ness Auditorium
6:30 – 7:45	Banquet	Hollenbeck Hall Ness Auditorium
7:55 – 8:35	After-Dinner Talk **"Resolved, that a football is a mathematical object."** Frank Ryan, Flatland	KSC Bayley Auditorium

Saturday, October 27, 2007

8:00 – 10:15	Registration	KSC Atrium
8:00 – 10:15	Vendor and Book Exhibits	KSC Room 141
8:00 – 8:50	Coffee and Donuts	KSC Atrium
8:05 – 8:40	Executive Committee Meeting	KSC Room 351
8:50 – 8:55	Announcements	KSC Bayley Auditorium
8:55 – 9:55	Invited Address **"Mathematics and Truth"** Frank Ryan, Flatland	KSC Bayley Auditorium
9:55 – 10:15	Break	
10:25 – 11:20	**Contributed Papers**	KSC Rooms 262, 319
11:30 – 12:30	Invited Address **"Surviving the White Water Rapids at the Confluence of the Mathematics Curricula for High School and College"**. Richard Little, Baldwin-Wallace College	KSC Bayley Auditorium
12:30	**Closing Remarks**	KSC Bayley Auditorium

Abstracts of Invited Addresses

Friday

Speaker: Tom Price
Title: *Approximating Sums of Infinite Series*

Abstract: I will describe a new method for approximating the sum of a series with a considerable reduction in computational effort. The algorithm proposed is a modification of the Euler-Maclaurin summation formula which is used to efficiently estimate sums of certain infinite series. The modified formula replaces the terms of a series with simple, easily constructed quantities that facilitate the calculation of integrals and derivatives associated with the Euler-Maclaurin scheme, thus providing a more tractable algorithm. Several examples are given to demonstrate the effectiveness and accuracy of the modified method. I will conclude with a brief analysis of the error incurred when using this new strategy which demonstrates that its accuracy compares favorably with that of the traditional Euler-Maclaurin summation formula.

A portion of the work formed a senior honors project by Kara Garrison. Kara is currently working for Sherwin Williams in Cleveland.

Speaker: Mihai Caragiu
Title: *Geometry with Complex Numbers*

Abstract: In the last three years, Ohio Northern University hosted a Summer Honors Institute for gifted high school students. The week-long "Geometry with Complex Numbers" course was offered in 2006 and 2007. The students were not assumed to have prior knowledge of complex numbers. In this talk I would like to share the experience we had with introducing geometrical transformations (such as rotations, reflections and projections) with complex numbers to talented high-school students, and we will explore ways in which they can be used to quickly derive elegant geometrical results including (but not limited to) the Simson's Line and the Nine Point Circle

Speaker: Frank Ryan

Title: *Resolved, that a football is a mathematical object.*

Abstract: Can this be? Well, yes and no; it depends on one's perspective. For my part, representing the set (of unknown cardinality) of professional footballers holding a doctorate in mathematics, I shall stand to affirm this proposition. My line of reasoning will expand upon a multitude of experiences − both on and off the field, and in and out of the classroom − with some of the stalwarts of my time, including Sid Gillman, Gerald Mac Lane, Paul Brown, Jack Lohwater, Blanton Collier, George Piranian, Bart Giamatti, Sir Edward Collingwood, Vince Lombardi, and Rolf Nevanlinna. The crucial final argument will reveal the connection between metamathematics and metafootball, drawing upon the platonic view of mathematics espoused by Kurt Gödel. Cross-examination may follow at the will of the people.

Saturday

Speaker: Frank Ryan
Title: *Mathematics and Truth: Have you checked your foundation lately?*

Abstract: In his paper[1] "Does mathematics need new axioms?" the logician Solomon Feferman speculates that 99% of working mathematicians expend their energies in fields other than mathematical logic and, further, he suggests that foundational axioms do not play an important role in their work. I must confess, Feferman had me pegged. We'll look at some of the foundation issues and their impact on mathematics, and we'll examine the foundational context of the Continuum Hypothesis and some of the unsolved problems of number theory which may or may not be examples of those true statements that cannot be proved according to Gödel's incompleteness result.

[1] *The Bulletin of Symbolic Logic*, Vol. 6, No. 4, Dec. 2000, pp 401−446.

Speaker: Richard Little
Title: *Surviving the White Water Rapids at the Confluence of the Mathematics Curricula for High School and College*

Abstract: This audience participation presentation will attempt to answer the question, "Can the mathematics education of Ohio's students (or those of any state) in grades nine through 16 survive the exciting turbulence provided by the various state and national agencies in their attempts to prescribe the mathematics we are to convey to our students ?"

Brief Biographies of Invited Speakers

Tom Price, University of Akron

Thomas Price was born in Sandersville, GA. After completing a Masters degree he served in the United States Army with a one-year tour of duty in Viet Nam. He received his Ph.D. from the University of Georgia in 1976 and accepted a position at the University of Akron. Dr. Price has enjoyed professional leaves at Kent State University, the University of South Florida, Colorado State University, and Cornell University. He was awarded the Buchtel College, the University of Akron, and the Ohio Section MAA outstanding teaching awards.

Dr. Price's teaching and research specialties were numerical analysis, approximation theory and number theory. He developed and taught new courses in each of these areas. His interdisciplinary research activities include work in Computer Science and Biomedical Medical Engineering. He managed undergraduate research teams and was a co-director of the NSF funded Research Experiences for Undergraduates program.

Since his retirement in 2006 Dr. Price has remained active in mathematical research and writing. He also does volunteer work for various Christian Ministries.

Mihai Caragiu, Ohio Northern University

Mihai Caragiu earned his undergraduate degree at the University of Bucharest. After receiving a Ph.D. in 1996 from the Pennsylvania State University, he held positions at Washington State University, Stanford University (Educational Program for Gifted Youth) and, since the Fall of 2000, at Ohio Northern University, where he is currently an Associate Professor of Mathematics. His research interests include number theory, finite fields, algebra and combinatorics. At Ohio Northern University he got involved in undergraduate research: since the Spring of 2001, his students presented 25 research results at various regional or national mathematics meetings. Out of his research papers, three are co-authored with undergraduates. In 2007-2008 he holds the Mary Reichelderfer Chair of Mathematics at Ohio Northern University

Frank Ryan, Flatland

Frank Ryan was born and raised in Texas. He attended The Rice Institute on an athletic scholarship, earning a BA in Physics in 1958. He subsequently received a PhD in mathematics in 1965 at the renamed Rice University. His thesis, which dealt with the boundary behavior of functions holomorphic in the unit disc, was advised by Gerald R. Mac Lane. He thereafter held faculty positions at Case Western Reserve University, Yale University, and Rice University. Concurrently with his academic agenda he pursued a career in professional football from 1958 to 1970, playing quarterback for the Los Angeles Rams, the Cleveland Browns, and the Washington Redskins. The latter assignment, combined with his interest in computer technology, led to his appointment as director of information systems for the U. S. House of Representatives in 1971. He left government service in 1977 to join Yale as athletics director and lecturer in mathematics. He left Yale in 1988 to join a small corporation that produced low-tech cable assemblies. This foray into the corporate world led to appointments on several corporate boards. In 1990 he returned to Rice as vice president of external affairs and professor of mathematics. After serving Rice for six years, he and his wife, Joan, an accomplished columnist for the Washington Post newspaper, retired to Grafton, Vermont. They will celebrate their 50th wedding anniversary next March. Their life together has been blessed with four sons and nine grandchildren.

Richard Little, Baldwin-Wallace College

Dick Little has managed to survive degree programs at four institutions of higher education: B.Sc.(Math) at Wittenberg.(Advisor: Norman Dodson), M.A. in Teaching at Johns Hopkins (Advisor: John Woodburn), NSF Academic Year Institute at Harvard (Advisor: Edwin Moise), Ph. D. at Kent State (Advisors: James Heddens and Kenneth Cummins). He taught at prep schools in Maryland, Indiana and Western Nigeria for seven years. In the fall of 1967 he joined the Mathematics Department of Kent State University and was assigned to the Stark Campus, where he taught Math for ElementaryTeachers, the calculus sequence and occasional junior level classes. In the fall of 1975 he joined the Mathematics Dept. of Baldwin-Wallace College, where he has survived ever since, with occasional time off for moderately good behavior.
Dick has served the Ohio Section, OCTM and the Ohio Math Educators Leadership Council as President, and on additional assignments for each of these organizations. He has survived numerous assignments from the Ohio Department of Education and the Ohio Board of Regents.. He has served three times as a consultant to Project Next.

# Contributed Paper Sessions
Friday, October 26

Time	Room 262 Session Chair Mark Smith	Room 319 Session Chair Gary Lobo	Notes
4:10 – 4:25	***Business Calculus: An Exploration of Teaching Experiences in an Unfamiliar Course*** Abstract 1 Krista B Hands Ashland University	***Finite Element Methods for EFK Equation*** Abstract 2 Champike Attanayake Bowling Green State University	
4:30 – 4:45	***Making Narrated Video Demonstrations*** Abstract 3 Barbara D'Ambrosia John Carroll University	***The Stieltjes Constants*** Abstract 4 Thomas P Dence Ashland University	
4:50 – 5:05	***A Means for Updating and Validating Mathematics Programs*** Abstract 5 Laurie A Dunlap University of Akron	***Beta-Rayleigh Distribution in Reliability*** Abstract 6 Alfred A Akinsete Marshall University	
5:10 – 5:25	***Technically Speaking: Preparing Our Students for Oral Presentations*** Abstract 7 Lew Ludwig Denison University	***Support Varieties for Some Weyl Modules of SO(2n+1)*** Abstract 8 Weiping Li Walsh University	
5:30 – 5:45	***Difficulty and Quality of Math Questions*** Abstract 9 Robert J Belloto Good Samaritan Hospital	***The Formula*** $$\int_a^b f(x)dx = F(b) - F(a)$$ ***Should Be Revised*** Abstract 10 Zengxiang Tong, Elizabeth Freshley Otterbein College	

Contributed Paper Sessions
Saturday, October 27

Time	Room 262 Session Chair Wiebke Diestelkamp	Room 319 Session Chair Jon Stadler	Notes
10:25 – 10:40	***Online Homework: Headaches and Hallelujahs*** Abstract 11 Pam Wovchko West Virginia Wesleyan College	***BV Functions and Sets of Finite Perimeter*** Abstract 12 Chris Camfield University of Cincinnati	
10:45 – 11:00	***Predicting scores on the Ohio Graduation Test*** Abstract 13 Wiebke S Diestelkamp University of Dayton	***Patterns in Coin Tossing and Fibinocci Sequences*** Abstract 14 M B Rao University of Cincinnati	
11:05 – 11:20		***Binomial-Free Differentiation*** Abstract 15 Jon D Stadler Capital University	

Abstracts of Contributed Papers
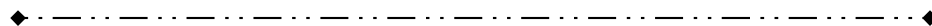
Friday 4:10 – 4:25

Business Calculus: An Exploration of Teaching Experiences in an Unfamiliar Course

Krista B. Hands
Ashland University

Abstract 1: The business calculus teaching experience is unique in many ways. In particular, it is a class that is typically taught in the mathematics department by mathematics instructors who never took such a course prior to teaching it. Because of this nuance, business calculus is perceived to be a difficult class to teach. To date no research has been conducted regarding those who teach this course. This study compares the beliefs and teaching practices of two experienced Graduate Mathematics Teaching Assistants (GMTAs) as they teach business calculus for the first time. The study included interviews and video tapings of teaching. In addition, administration are interviewed regarding the course itself, perceptions about the course, and those affected by the course. Finally, comparisons are made between the two GMTAs and inferences are drawn based on their experiences.

Finite Element Methods for the Extended Fisher-Kolmogorov (EFK) Equation

Champike Attanayake
Bowling Green State University

Abstract 2: Extended Fisher-Kolmogorov (EFK) Equation plays an important role in the study of pattern formulation in bi-stable systems. In this talk, using conformal finite element method, I will discuss error estimate for the semidiscrete scheme of the EFK equation. Then I will present some fully discrete schemes by discretizing this system in time by various finite difference approximations.
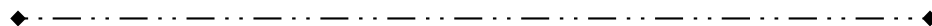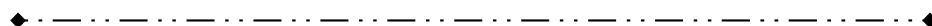
Friday 4:30 – 4:45

Making Narrated Video Demonstrations

Barbara D'Ambrosia
John Carroll University

Abstract 3: I've recently started building a library of video demonstrations for students in undergraduate math classes. These short video clips demonstrate the use of a graphing calculator or a computer software package, or repeat classroom computer demonstrations of various topics. The information in the videos is hard for students to take notes on, because it involves action. By making the videos available online, I enable students to review information they may not have caught in class. I'm also able to avoid spending class time discussing technical calculator tasks that most students have already mastered. In this talk, I will demonstrate some features of a few videos, and discuss some of the issues involved in creating these videos.

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The Stieltjes Constants

Thomas P. Dence
Ashland University

Abstract 4: I will present a few facts known about the Stieltjes constants, and there aren't too many that are known, along with a couple of neat places where they crop up in calculations.

Friday 4:50 – 5:05

A Means for Updating and Validating Mathematics Programs

Laurie A Dunlap
The University of Akron

Abstract 5: The purpose of this presentation is to detail the steps of a Delphi survey conducted for the purpose of producing rated questions for use in a cyclical process of updating and validating mathematics departments programs. The participants of the survey consisted of administrators and faculty from a random sample of departments across the Midwest. Discussed are the factors triggering the need for reform, the construction of the rated questions, and the distillation of the responses into their underlying categories using principle components analysis. These categories also encompass the questions that were independently generated by the Committee on the Undergraduate Program in Mathematics (CUPM). The similarities between the two sets serves as validation for both. It is hoped that these results can be used as a starting point to assess departments in other disciplines.

Beta-Rayleigh Distribution in Reliability

Alfred A Akinsete
Marshall University

Abstract 6: The problem of estimating the reliability of components is of utmost importance in many areas of research. There are many contributions regarding the estimation of reliability in the literature. For example, in the area of stress and strength models, we may have X representing the strength capable of withstanding a random amount of stress Y in a component. The component fails at the instant that the stress applied to it exceeds the strength. Thus the component will function as long as $X > Y$. The quantity $R = \text{Prob}(Y < X)$ measures the reliability o f the component. The algebraic forms for $R = \text{Prob}(Y < X)$ are known for the normal, uniform, gamma, Weibull, Pareto, and in particular the exponential distribution. Here, we compute $R = \text{Prob}(Y < X)$, when both X and Y have the beta-Rayleigh distributions. We obtain some properties of the mixed distribution, and derive the corresponding form for R.

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Friday 5:10 – 5:25

Technically Speaking: Preparing Our Students for Oral Presentations

Lew Ludwig
Denison University

Abstract 7: In the fall of 2006, we secured a Course, Curriculum, and Laboratory Improvement (CCLI) grant from the National Science Foundation to develop a series of video vignettes that prepare students to give more effective oral presentations in mathematics. In this preliminary report, we discuss the current status of the project as well as view several of the vignettes. Participants will have a chance to become part of the preliminary evaluation process by using the materials at their schools.

Support Varieties for Some Weyl Modules of SO(2n+1)

Weiping Li
Walsh University

Abstract 8: We used some elementary methods to compute the support varieties for some Weyl modules of algebraic groups of type B_n.

Friday 5:30 – 5:45

A study on the difficulty and quality of test questions in a pharmacy math course

Robert J Belloto
Good Samaritan Hospital

Abstract 9: Purpose: To examine the quality and difficulty of questions asked in a pharmacy math course. Methods: The Rasch psychometric model was used to analyze students response to all test questions asked over a four year period. The analysis provides an estimate of the difficulty of the question while simultaneously providing an estimate of the student's ability. An examination of the fit of the questions to the model provides an estimate of the number of poorly written questions. Results: Over the study period, the percentage of poorly written questions decreased from 12.1 percent to 2.7 percent. Conclusions: Rasch analysis of test questions provides insight as to how a student's grade depends upon the quality and difficulty of the questions received. The study raises questions on the pervasive use of grading scales based upon the raw percentage of test questions answered correctly.


The Formula $\quad \int_a^b f(x)dx = F(b) - F(a) \quad$ *Should Be Revised*

Zengxiang Tong,
Elizabeth Freshley
Otterbein College

Abstract 10: The above formula is in James Stewart's book Calculus, under the title "The Fundamental Theorem of Calculus (FTC)". Almost all calculus textbooks use this formula to express one part of FTC. This paper gives three

reasons to show that this formula should be revised as $\quad \int_a^b f(x)dx = F(b-0) - F(a+0)$

Reason 1 will reveal the necessity to revise the formula, reason 2 will show the advantage of the revised formula over Stewart's, and reason 3 will show that the revised form makes improper integral a very natural extension of proper definite integral.

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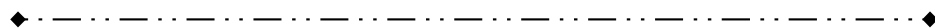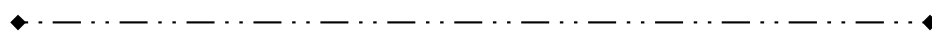
Saturday 10:25 – 10:40

Online Homework: Headaches and Hallelujahs

Pam Wovchko
West Virginia Wesleyan College

Abstract 11: Online homework sounds like a glorious idea, no grading! However, the glory does not come without a few evils. Learn about my experience using online homework with Math for Liberal Arts students and Calculus students. Find out what students liked and disliked, see how test performance was affected, and discover some tips on implementing online homework in your classes.

Functions of Bounded Variation, Sets of Finite Perimeter, and Fractals

Chris Camfield
University of Cincinnati

Abstract 12: Functions of bounded variation (BV functions) play a very important role in the study of calculus. These are functions whose first derivative can be represented by a measure instead of a function. The power in using a measure as a derivative is that you can detect change in a function on sets too small for a classical derivative to handle, such as the jump a step function makes at a point. This theory then provides a way to define the perimeter of any set by analyzing its characteristic function. In recent years , work has been done (including my dissertation) to extend this theory to non-Euclidean metric spaces. We will show what the study of BV functions teaches us about sets with fractal boundaries and give examples of open questions that can be used as undergraduate research projects.
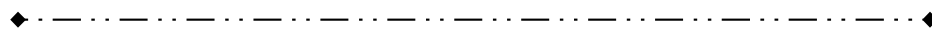
Saturday 10:45 – 11:00

Can online adaptive tests be used to predict scores on the Ohio GraduationTest?

Wiebke S Diestelkamp
University of Dayton

Abstract 13: In 2006, Dayton Early College Academy, a non-traditional high school posed the following question: Is the adaptive online test that the school is using to assess their students' skill levels in various subjects a useful tool in predicting a student's success on the Ohio Graduation Test? We will show how linear regression models provided a (partial) answer to their question.

Patterns in Coin Tossing and Fibinocci Sequences

M B Rao
University of Cincinnati

Abstract 14: Toss a fair until you get the pattern HHHHH. Let U be the number of tosses required. We will talk about the distribution of U, its expectation, and variance. Explain where Fibinocci enters the calculations. Toss a fair coin until you get the pattern HHHHT. Let V be the number of tosses required. We will talk about the distribution of V, its expectation, and variance. In this talk we take up problems of this sort. We will also indicate some connection to DNA analysis.

Saturday 11:05 – 11:20

Binomial-Free Differentiation

Jon D Stadler
Capital University

Abstract 15: To derive the formula for the derivative of a power function, the standard method is to use the binomial theorem. Two alternate methods will be presented, one of which George Andrews discussed in an article praising the applications of the geometric series. The second method uses synthetic division. Despite being rather straightforward, the synthetic division method does not seem to be widely known.

NOTES

Acknowledgements

The Ohio Section would like to thank the faculty and staff of the Mathematics Department at Wittenberg University for their efforts in hosting this meeting. Special thanks go to Brian Shelburne, the Chair of the Local Arrangements Committee.

The Section also wishes to thank Ohio Northern University for providing the funds to print this program. Thanks also go to the exhibitors for their support of the meeting.

Coming Events!

The **Spring Meeting** of the Ohio Section will be **April 11-12, 2008** at **Marietta College** in Marietta, Ohio. Invited speakers are **Carl Pomerance** of Dartmouth College, **Lew Lefton** of Georgia Tech and **Bill Higgins** of Wittenberg University.

The Ohio Section **Summer Short Course** is scheduled for the **third week of June** (the exact dates are still to be determined) at **Xavier University**. **David Pengelley** of New Mexico and **Danny Otero** of Xavier will be co-presenters. The topic will be the use of original historical sources in mathematics teaching and research.

Undergraduate Mathematics Day at the **University of Dayton** will be held on **Saturday, November 3, 2007**. Contributed talks from undergraduates celebrating mathematics in all forms –- research, learning, teaching, history are invited. Talks presented by high school students, graduate students and faculty are also welcome. In honor of Leonhard Euler's 300th birthday, **Bill Dunham** of Muhlenberg College will present *"An Euler Trifecta."* A second invited talk will be given by **Colleen Hoover** of St. Mary's College. There is no registration fee. For registration information and other details visit http://academic.udayton.edu/MathEvents/Fall07/