Spring 2001

MATHEMATICS NEWS
UNIVERSITY OF IDAHO

Inside this issue:

Polya Math Center

By James Calvert

About 2400 students each year take Math 107 or 143 to refresh the basic algebra taught in the high schools. Historically, over 30% of the students in Math 107 and in Math 143 receive a grade of D, F, or W. Most of the students who do not succeed in these courses either repeat them, switch to a major that does not require mathematics, or withdraw from the university, all expensive propositions for the students and the university. The Mathematics Department hopes to dramatically improve the success rate in these courses with a new way to help students learn.

In Fall 2001 the Polya (pronounced *pole-yuh*) Math Center will begin operation in the space in Brink Hall now occupied by the Career Center and the adjacent area in Phinney Hall that formerly served as the anthropology lab. Our goal

(Continued on page 4)

Susan and Jim Calvert in Glacier Park Canada

Jim Calvert Retires

On July 1, James Calvert will retire from UI after 34 years of service. For the past three years he has served as Chair of the department. He also served as Chair from 1982 to 1990. Calvert received his B.S. in Electrical Engineering from the University of California at Berkeley, and M.S. and Ph.D. in Mathematics from the University of California at Davis. He was a corporal in the Marine Corps and has worked as an electronics engineer at the Lawrence Radiation Laboratory. He came to the University of Idaho in 1967 as an assistant professor and became a professor of mathematics in 1976. His research involves boundary value problems in differential equations and formal languages. He is well known for his teaching of mathematics courses for elementary teachers and of mathematics courses for computer scientists. He also has served as secretary-treasurer of the Pacific Northwest Section of the Mathematical Association of America. He has had two Ph. D. students: Kathy Ayers and Jesse Jon Turner.

An Interview with Professor Calvert follows on page 2.

* An Interview with Professor Jim Calvert * Retiring Professor and Chairman

When did you first become interested in mathematics?

I did my senior year at Mountain View High School which is close to Stanford University. George Polya was a professor at Stanford who frequently visited high schools in the area. After speaking to a class I was taking Professor Polya invited me to attend his year-long seminar at Stanford. The seminar met for several hours once a week to talk about mathematics and try to do some research. That was when I first found mathematics interesting.

Where did you go to high school and where did you go to college?

I began high school in Coronado, California, an island off San Diego. I actually learned some pretty good mathematics there. There were only five of us who actually took mathematics beyond the most elementary areas. In those days not everyone was required to take much mathematics. We had the same instructor in all of our mathematics classes. He took us about as far as we were able to go. We even studied some calculus, which was not much done in high school in the late 1940's. I moved with my family to Mountain View for my senior year of high school.

I was admitted to Stanford but could not afford the tuition. There was not any financial aid in those days. I went to the University of California in Berkeley where the fees were $35 a semester. I was an electrical engineering major which was interesting because I was able to work on a new gadget called a computer that was built with vacuum tubes. I became attracted to mathematics while taking a course in logic and formal language theory taught by Tarski and Henkin.

At what point did you decide to switch into mathematics and go to graduate school?

When I returned from the Marine Corps I worked for a while for the Secode Corporation in San Francisco. They were trying to build a car telephone using a mechanical pulse receiver, a product that never worked when the car was in motion. I then married a lovely Berkeley student and took a job at the Lawrence Radiation Laboratory on the hill above the Berkeley campus. I worked on the 88-inch cyclotron project as an electronics technician trying to move nanosecond pulses through a wave conductor, something that had not been done much at that time. Since modeling with differential equations offered more promise than the hit and miss experiments the engineers were doing, I began to take math courses at UC and managed to finish my undergraduate degree in mathematics. Then I quit my job at LRL and moved to the Davis campus of UC to work on a Ph.D. I completed that degree in a little over three years, being in rather a hurry because children kept coming.

What made you decide on specializing in analysis? Was it your work with differential equations?

No, actually my first interest was algebra. I took a course in semigroups from Takeda. It was conducted in Japanese; even so, I found it interesting. The rest of the algebra instructors were boring. I considered topology for awhile. The first semester was okay, but the second was algebraic topology taught by Spanier in French, another language I did not know. He kept passing out inscrutable notes for a book he was writing. I never did learn much algebraic topology even though I bought his book a few years after taking the course. The analysis instructors were more interesting and I knew I could produce a dissertation in that area more quickly.

Was there a professor who especially motivated you or who you especially enjoyed?

There were some good professors at UC Davis, but the one who mostly continued to motivate me was George Polya at Stanford. My dissertation concerning the Dirichlet problem actually grew out of the study of isoperimetric inequalities with Polya when I was in high school. My major professor at Davis, Don Benson, was a Stanford graduate who worked with Paul Szego. Together we visited Szego and P at Stanford. During lunch, the concep of my dissertation was so clarified tha I quickly solved my problem.

Can you describe the research that you do?

Most of my research has been in exis tence theorems for nonlinear boundary value problems. I did some work in formal languages in the 1980's and di rected two Ph.D. dissertations in tha area. Formal languages seemed mor important in the early days of com puter science when people were actu ally using it to develop computer pro gramming languages.

What made you decide to come to Idaho?

In 1966 there were jobs in mathemat ics open everywhere. I traveled aroun the northwest interviewing univers more than being interviewed by the I picked Idaho because it looked like good place to live and raise childre

The members of the math department appeared to be an amicable group, the country is beautiful, and there was only one stoplight in town.

Of what achievements at the University of Idaho are you most proud?

I think I contributed to building the graduate and research program while chairman in the 1980's. The administration tried to abolish our Ph.D. program because of the difficulty of attracting graduate students at that time. I had some effect on helping the program survive by releasing faculty from teaching to do research, increasing the number of teaching assistants, and in attracting graduate students.

I am very proud of the development of the Polya Mathematics Center that opens in Fall 2001. I think this project will greatly enhance the teaching of mathematics at all levels. Beyond improving the success rates in pre-calculus and calculus courses, the Polya Center will provide a continuing resource for students who use mathematics in their major programs. We plan to establish partnerships with instructors of advanced courses that use mathematics whereby the instructor can refer students to the Polya Center for a short refresher of a mathematical topic needed but forgotten by students. Now, an engineering professor for instance, wanting to use Fourier analysis in a senior class has choices of having students review the subject themselves (which few can do because they sold the book and never could read it anyway), taking up class time for a review, or dumbing down the course by avoiding the mathematics. By prior arrangement with the instructor, the Polya Center can offer a short course on the subject, delivered mostly by computer, that will rather painlessly refresh the student's memory. In such ways as this, the Polya Center can become a cooperative partner in helping students apply mathematics throughout the curriculum.

You will retire in July this year. What are your goals for the next few years?

My goals are to have a good time. I do black and white photography. We are going to buy an RV to travel about and do a lot of hiking and landscape photography. I will probably build a small darkroom into the RV for developing negatives. I will also do some woodworking in the winters, building looms and things. Perhaps, I will get around to writing a mathematics book.

UNIVERSITY OF IDAHO DEPARTMENT OF MATHEMATICS

We're on the web: www.uidaho.edu/LS/Math/

DID YOU KNOW:

James Calvert is the only person to be head of the department for two different periods. He served as Chair from 1982 to 1990 and from 1998 to 2001.

Eugene Taylor was the first person specifically named as head. (The 1932 catalog lists him as head, but it is clear that he was the highest ranking member from the time he came here in 1920.) Taylor served as head until he retired in 1950. J. Lawrence Botsford was acting head from 1950 to 1954. He retired from the university in 1970. Kenneth A. Bush became head in 1954 and served until 1961 when he became a professor at Washington State University. He retired from WSU in 1980. Hans Sagan was the Chairman from 1961 until 1963 when he went to North Carolina State University. Howard Campbell came here in 1963 from Michigan State University to be Chairman. He retired from the university in 1981. Larry Bobisud was Chairman from 1978 until 1982. James Calvert was Chair from 1982 until 1990. Clancy Potratz was Chair from 1990 to 1994 when he retired. Erol Barbut was Chair from 1994 until 1998. He retired from UI in 1999 but is still active in the department.

(Polya Math Center cont.)

(Continued from page 1)

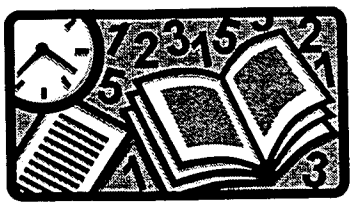
extends beyond simply imparting algebra skills to prepare for calculus to teaching students how to learn mathematics. Many of the students in our pre-calculus courses have already failed in some way to learn or retain the very mathematics we are teaching. We want to provide them with a successful experience that builds confidence in their ability to learn more advanced mathematics by helping them to discover a way of studying that works for them. To that end we offer a variety of activities and paces, and we encourage students to experiment with alternative methods.

Polya will offer a comfortable place in which students can work individually or in groups with help immediately available from undergraduate or graduate teaching assistants and faculty instructors. Polya computers will deliver lectures by video-on-demand formatted so that students can watch an entire lecture covering a section of the text or any portion of the lecture. Students can use the computers to work exercises from the text and receive immediate confirmation of the accuracy of their work and assistance with solving problems either from the software or from teaching assistants. Quizzes and exams to monitor progress will be taken at the computer. If a student is not satisfied with the score on a quiz or exam, he or she can repeat the quiz or exam after an interval of study. Quizzes and exams can generally be taken up to 3 times before counting for the record.

The construction of the Polya Math Center was financed by a grant the Mathematics Department received from the Pew Foundation with additional funding by the State Board of Education and the university. In the beginning Polya will only serve the pre-calculus students; however, we expect it to quickly grow to support all of the calculus classes and to become a resource to which students can return when they find a need to refresh their mathematics while taking advanced courses in their major subjects. Detailed information about the project can be found at www.its.uidaho.edu/polya.

Internet Math Challenge

"Parents and Teachers challenge your kids !"



The department continues to run a contest for pre-college students via the Internet Math Challenge. The contest, found at:

http:/www.uidaho.edu/~imc

features a weekly math puzzle. Each week a specially designed prize T-shirt is awarded to one of the students submitting a correct solution. Students who answer at least 5 weekly puzzles correctly become eligible for the grand prize drawing in May, when we will award a personal computer donated by Micron Technology.

This contest has generated a lot of interest, with hundreds of entries coming from schools around the region, as well as from students as far away as Massachusetts, Georgia, and Alaska. (Even some very talented elementary students have been participating!)

Check out the homepage for the contest – you'll find past puzzles (and solutions), a list of past winners, links to other math education resources, and of course, this week's puzzle!

* Scholarship Information *

Several scholarships are available to mathematics majors, all are based on merit. The Taylor, Botsford, Wang and Hower scholarships are awarded to mathematics majors entering their junior or senior year. Total awards for these scholarships are $500, $1500, and $2500. The Mathematics Department Scholarship has no class restrictions. If you are a mathematics major, you will automatically be considered for a scholarship. If you are not now a mathematics major, you can still be considered. Merely fill out an application form obtained from the secretary and indicate that you will become a mathematics major or will add mathematics as a second major. The selection is made by the faculty of the department in March.

J. Lawrence Botsford Scholarship

This scholarship was established by the family of J. Lawrence Botsford who was a member of the department from 1949 until his retirement in 1970. He also served as head of the department from 1950 to 1954. This scholarship is based on merit and is awarded to mathematics majors entering their junior or senior year.

Roy Tromble is this year's recipient.

Linn Hower Honor Scholarship

This scholarship was established in 1991 by Mildred and Loyal L. Hower, parents of Linn Hower, who graduated from the University of Idaho in 1979 with a B.S. In Mathematics. This scholarship is awarded to junior and senior applied mathematics majors, preferably from rural Idaho, with a high potential for success in a mathematics or scientific field.

Sarah Potratz is this year's recipient.

Mathematics Department Scholarship

This scholarship is supported by annual contributions of friends of the department and is awarded primarily to freshman and sophomore mathematics majors.

Dan Brodock, Lee Newbill, Timothy Paulitz, and Katherine Smith are this year's recipients.

Ya Yen Wang Memorial Scholarship

A long-time member of the Mathematics faculty, Ya Yen Wang died in January of 1995. Acting on her wishes, her family established the Ya yen Wang Memorial Scholarship. This scholarship is intemded for a junior or senior in Mathematics, preferably to be awarded to a woman.

Elizabeth Alford is this year's recipient.

Eugene and Osa Taylor Mathematics Scholarship

This scholarship was established in 1979 by the family and friends of the first head of the department, Eugene Taylor and his wife Osa. He directed the department from the time he came to the department in 1920 until he retired in 1950. In 1981, his family donated many of his personal mathematics books to the University of Idaho library. This scholarship is based on merit and is awarded to mathematics majors entering their junior or senior year. The recipients of the Taylor Scholarship this year were:

Elizabeth Alford, Craig Beisel, Matt Benke, Jayne Bird, Ken Brandt, Daniel Burton, Matt Dunmore, Forrest French, Richard Giampietri, Stephen Haler, Chris Hiatt, William Hostetter, Timothy Householder, Sarah Potratz, Roy Tromble, *and* ***Brandy Wiegers.***

* STUDENT ACTIVITIES *

RIC GIAMPIETRI was named to the second team on the Verizon Academic All-American team. He has been a two year starter as a linebacker for the UI football team. This year he was Idaho's second leading tackle with 97. He led the Vandals with tackles for loss and was second in sacks. Ric was the only player from the Big West or Pac-10 conferences to make the top two teams. In December he was given one of the Alumni's Awards for Excellence.

BRANDY WIEGERS spent the fall semester at the Bermuda Biological Station for Research at St. George's, Bermuda. She helped create mathematical models for biological phenomena.

In October ***BRAD DIRKS***, Assistant Vice President of Regence Blue Shield in Lewiston, talked to Math students about his experience working as an actuary. Dirks graduated from UI in 1992 with a B.S. in Applied Mathematics.

* SENIOR NEWS *

MAY GRADUATION

A reception will be held for mathematics graduates and their guests following the Letters and Science commencement ceremony on Saturday, May 19, 2001. Last year, parents and guests of graduates enjoyed visiting with the faculty and other graduates. During this semester we will request the addresses of your guests so that we may send them an invitation. We hope that all graduates and their guests will come to the reception.

EMPLOYMENT

One of the bulletin boards outside the department office (300 Brink Hall) is devoted to job opportunities. Career Services' monthly list of campus interviews will be posted there along with other job information the department receives. You can sign up at Career Services to schedule interviews with companies interested in mathematics majors. Your instructors can write letters of recommendation for the Career Services files, and they can also write letters of recommendation to specific employers.

GRADUATE SCHOOLS

Another bulletin board outside the department office is devoted to graduate school posters. Your advisor also has more information which can help you. Your instructors can write letters of recommendation for you which can be sent to each university to which you apply. Several copies of a pamphlet listing assistantships and fellowships in mathematics, statistics, and computer science in the U.S. are available. See Ralph Neuhaus in Brink 302 for a copy.

* ACTUARIAL SCIENCE UPDATE *

To become an actuary, you need to pass a series of exams. The beginning exams cover certain mathematical and statistical subjects. In 2000 the Society of Actuaries and the Casualty Actuarial Society changed the format and content of the exams. There are fewer exams, but each covers more material. Many of the exam questions involve applications of mathematics and statistics to actuarial problems. Students who have passed exams prior to the year 2000 will be given credit in the new system. At the UI, the requirements for the major, Applied Mathematics: Actuarial Science Option, have been changed to reflect the new exams. The requirements appear in the 2000 UI General Catalog. They can also be found by visiting the Mathematics Department homepage: **www.uidaho.edu/LS/Math/**

Current students will be able to graduate under the existing requirement or the new curriculum requirements. Ralph Neuhaus can tell you more about the new exam format.

* SPRING EXAM DATES *

The exam for Course 1 will be given:
Wednesday, May 23, 2001.

The exam for Course 2 will be given:
Thursday, May 24, 2001.

Both exams can be taken at UI. The deadline for applications to reach the Society of Actuaries for the May exams is:
April 1, 2001.
Application forms can be obtained from Ralph Neuhaus, Room 302, Brink Hall.

Review for Exam 1
can be arranged by contacting Ralph Neuhaus.

* FREE FOR THE ASKING *

(See Ralph Neuhaus in 302 Brink Hall)

The magazine CONTINGENCIES, a publication of the American Academy of Actuaries has interesting articles about things that affect the insurance industry. The most recent issue had an article on the Federal Role in Disaster Protection and another article on Analyzing New Casino Games.

The ASSOCIATESHIP and FELLOWSHIP CATALOG of the Society of Actuaries contains all the rules and requirements necessary to become an Associate of the Society.

* NEWS OF FACULTY AND STAFF *

Veteran's Day **ELNA GRAHN** was featured in a front-page story in the Moscow-Pullman Daily News about her experience as one of the first woman officers in the U.S. Army during World War II. She was one of 40 women to graduate from the U.S. Army Command and Staff College at Fort Leavenworth, Kansas. She also spoke at a noon meeting at the Women's Center. Professor Grahn started teaching at UI in 1947 retiring in 1969. "The Army taught me discipline and hard worth. But it also gave me a confidence in myself that I never though possible. I have led an interesting life, I owe that to myself, but also to the Army."

MARY VOXMAN and **KIRK TRIGSTED** attended the International Conference on Technology in Collegiate Mathematics in Atlanta, Geogia in November.

GAIL ADELE, MARK NIELSEN, and **DORA BIALOSTOCKI** gave presentations at the Idaho Council of Teachers of Mathematics Conference. **GAIL ADELE** also gave a presentation at the Northwest Mathematics Conference in Victoria, B.C. in October.

RALPH NEUHAUS and **PAUL JOYCE** attended the annual meeting of the American Mathematical Society in New Orleans this January.

PAUL JOYCE and **STEVE KRONE** gave a talk at the Workshop in Stochastics in Sequence Alignment in Population Biology in Frankfurt, Germany in October. Steve and Paul are also investigators on an National Science Foundation grant in Bioinformatics and Evolution. This is a multidisciplinary study with Professors Holly Wichman and Jack Sullivian from Biology and Professor Janes Foster, Scott Harrison, Robert Heikendorn, and Axel Krings from Computer Science.

MARK NIELSON gave a talk at Big Sky Discrete Math Conference at the University of Montana in September.

STEVE KRONE gave a talk at the Canadian Mathematical Society Meeting, in Vancouver, B.C. in December.

PAUL JOYCE was an invited visitor at the Max Planck Institute in Liepzig, Germany. Paul is also a principal investigator with Professor Lisette Waits of the Department of Fish and Wildlife Resources, on an NSF grant integrating non-invasive forensic genetic studies.

* PRIZE PROBLEMS *(Continued from back page)

3. Show that for all positive values of p, q, r, and s

$$\frac{(p^2 + p + 1)(q^2 + q + 1)(r^2 + r + 1)(s^2 + s + 1)}{p\,q\,r\,s}$$

cannot be less than 81.

4. Determine, without listing, the number of positive integers whose decimal representation consists of distinct digits.

5. Consider a table of numbers, with n rows and n columns, where n is positive odd integer. All of the entries are integers between 1 and n, and each integer between 1 and n appears exactly once in each row and column. The table is symmetric about its main diagonal; this means that the number appearing in the ith row and jth column is the same as the number appearing in the jth row and ith column. Show that each integer between 1 and n appears exactly once on the main diagonal.

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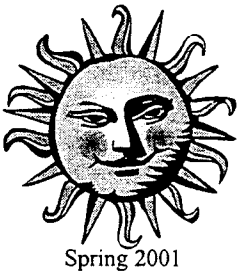

Spring 2001

* PRIZE PROBLEMS *

Solve one of the problems below and you win a book! You can choose a book about mathematics, the history of mathematics, a collection of famous theorems, a collection of problems, special topics, and so forth. Some problems may appear hard or impossible. But all have either a brief or a short solution if you approach them in the right way. **Rules for participating:** **1.** *You must be an undergraduate, an alumnus, or an alumna.* **2.** *You must solve one of the problems.* **3.** *One prize per person.* Prizes will be awarded while supplies last. Show or send your written solution to Ralph Neuhaus.

1. A regular 400-gon is tiled with non-overlapping parallelograms. Show that at least 100 of these parallelograms are rectangles.

2. Evaluate the infinite product: $3^{\frac{1}{3}} \cdot 9^{\frac{1}{9}}\, 27^{\frac{1}{27}} \cdot \cdot \cdot (3^n)^{\frac{1}{3^n}} \cdot \cdot \cdot$

   (The definition of an infinite product is analogous to the definition of an infinite series.)

(Problems continues on page 7)