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Katherine Okikiolu is the 2002 Claytor Lecturer in San Diego. See article "A Young Mathematician Excels" inside.

NOMINATIONS: Nominations are in for NAM's Secretary/Treasurer, Region B Representative, and Community College Representative. For more see article inside.

CALENDAR

NAM's Online Conference Calendar at http://www.caam.rice.edu/~nated/orgs/nam/programs/conferences.html
Look here for links to relevant conferences announcements.

July 9-13, 2001 SIAM Annual Meeting (Diversity Day) Town & Country Hotel, San Diego, CA

June 19-22, 2001, CAARMS7 at Duke University, organizers: William A. Massey and Arlie O. Petters, sponsors: Duke University, Morgan State University and the National Security Agency

October 4-6, 2001 NAM Undergraduate MathFest XI Holiday Inn Select - Downtown Capital Hill, Tallahassee, FL

October 18-20, 2001 Richard Tapia Celebration of Diversity in Computing Symposium Sofitel Houston Hotel, Houston, TX

January 6-8, 2002 ACM-SIAM Symposium on Discrete Algorithms Radisson Miyako Hotel, San Francisco, CA

January 6-9, 2002, Joint Meetings NAM, AMS, MAA in San Diego 2002, San Diego Convention Center

July 8-12, 2002 SIAM 50th Anniversary & Annual Meeting (Diversity Day) Philadelphia Marriott Hotel, Philadelphia, PA

June 2002 CAARMS 8, Princeton, New Jersey

OLDER THAN WE THINK

Scott Williams

The first time I studied Calculus Two, I was extremely impressed by nearly two thousand year old theorems attributed to the Greek mathematician Pappus. Here is the first:

THEOREM 1. Suppose that a plane region R is revolved around an axis in its plane not intersecting the interior of R, generating a solid of revolution. Then the volume of the solid is the product of the area of R and the distance traveled by the centroid of R.

The proof I read used double integrals, and I thought, Calculus was invented three hundred years ago, so how did a mathematician know about, much less prove, this theorem more than a thousand years earlier?

Recently, I learned that the Pythagorean Theorem might be a thousand years older than Pythagoras. Another old topic concerns "reasonable" approximations of Pythagoras' number p which the Egyptians took as approximately
4(8/9)2 or 3+1/9+1/27+1/81.

The best early approximation was due to another mathematician who studied in Egypt, Archimedes, born 287 B.C., who discovered 223/71 < p < 22/7.

In order to compute volumes, Archimedes probably developed some methods of integral calculus. Now it turns out that Archimedes knew a lot of differential calculus as well.

More than 2,200 years ago, Archimedes recorded his thoughts on papyrus scrolls that were then copied by scribes during the next millennium. Around the year 1000, a scribe then copied the theories and drawings onto parchment sheets and bound them between wooden boards. The document is now known as Archimedes Palimpsest.

William of Moerbeke (1215-1286) was archbishop of Corinth and a classical scholar whose Latin translations of Greek works played an important role in the transmission of Greek knowledge to medieval Europe. He had two Greek manuscripts of the Archimedes document and he made his Latin translations from these manuscripts.

The first of the two Greek manuscripts has not been seen since 1311 when presumably it was destroyed. The second manuscript survived longer and was certainly around until the 16th century after which it too vanished. However, it was copied several times and some of these copies survive.

Up until 1906, no sources of Archimedes' works appeared to survive the Dark Ages which were not based on the Latin translations of Moerbeke or upon the copies of the second Greek manuscript which he used in his translation.

In 1906 in a Greek quarter in Constantinople, the Dutch scholar Johan Ludvig Heiberg discovered the 174-page the Archimedes document in the library of the Metochion of the Holy Sepulchre in Istanbul. This manuscript had been copied in the 10th century by a monk in a Greek Orthodox monastery Constantinople. Then in the 12th century the parchment had been washed and religious texts written on top, creating what's known as a "Palimpsest", or a text on parchment which has been overwritten with other text.

Originally the pages were about 30 cm by 20 cm but when they were reused the pages were folded in half to make a book 20 cm by 15 cm with 174 pages. This involved writing the new texts at right angles to the Archimedes text and, since it was bound as a book, part of the Archimedes text was in the spine of the "new" 12th century book. To make Heiberg's task even harder, the pages of the text had been used in an arbitrary order in making the new book.

Though Heiberg worked with a simple magnifying glass, he had amazing finds. The Palimpsest contained four works which were already known, but the versions on the palimpsest were independent of the two lost manuscripts used by William of Moerbeke in his Latin translations. This was an exciting find for scholars wanting to gain more insight into the original contents of Archimedes work. Better still the Palimpsest also contained a text of "On floating bodies" which up until that time was only known through Latin translations. Best of all however, was the fact that a work of Archimedes was found on the palimpsest for which no copy in any language was known in recent history. It was the extremely important Method of mechanical theorems only known in biographies of Archimedes. "Method..." showed Archimedes anticipated the route taken 2,000 years later by Isaac Newton, and used to describe how everything moves, from electrons, to falling objects, to planets.

After Heiberg had completed his research but before his final book was published, the Archimedes Palimpsest disappeared again from Turkey during World War I. Exactly what occurred is not yet clear. Though it was, it appears, in the hands of an unknown French collector from the 1920s, it remained officially lost, and most people assumed that it had been destroyed. It surfaced in 1998 by an anonymous seller at an auction in Christie's in New York where it was put on display with the spine broken open to reveal all the original text which had been in the spine when it had been examined by

Heiberg. It was sold to an anonymous U.S. collector for two million dollars on 29 October 1998 and the new owner agreed to make it available for scholarly research. Since January 1999, it has been on display at Baltimore's Walters Art Gallery, to which the anonymous owner loaned it for conservation and research.
[see http://www.thewalters.org/archimedes/frame.html where you can also read an Archimedes timeline].

What eluded Heiberg were two lines on each page bound in the Palimpsest's spine and other parts not visible to the naked eye, which now have been studied with modern sophistication. It has been scanned by cameras that filter infrared to ultraviolet light. The images have also been analyzed with light focused beneath the surface of pages (this is the same remote sensing software used on satellite images of Earth) to create three-dimensional topographical maps of the parchment, which holds a faint stain of ink scraped off by a scribe 1,000 years ago. And it has been gently prodded by a sharpened syringe, a fragment of its parchment extracted, and the parchment fibers analyzed. A Microsoft video file gave Canadian parchment expert Greg Young a way to compile images of those heat-tested fibers to determine the health of the old goatskin.

Roughly six per cent of Archimedes' works are lost in its spine. Another portion is covered by 20th-century forgeries -- full-page illustrations thought to have been added to increase the value of what its owners believed was just another religious relic.

Both the 10th-century and 12th-century inks tested were confirmed to be iron gall, a solution made from gallnuts - bulbous growths on oak trees attacked by parasites - ground down and mixed with iron sulphate, rainwater, gum arabic and a little vinegar. Rich in tannic acid, they are the inks that can eat at old paper - to the extent that what remains is the shape of the letter as if it had been cut out. But by chewing their way into the fibers of the parchment, they leave stain on the Archimedes text, centuries after the ink itself was erased.

Around 1950, a French bookbinder also applied modern glue to about half of the Palimpsest's binding - glue that cannot be dissolved. The other half is held together with soluble glue from animal hide. Another piece of good news is that the modern glue - polyvinyl acetate which also cannot be dissolved - can be made pliable or dispersed.

Recently in the journal Sciamus, scholars describe new access to portions of text unavailable to Heiberg. They have found an unexpected phrase, “equal in magnitude” that suggests Archimedes went close to 17th-century Newton and the scientific revolution.

References:
Peter Beckman, A history of p, Barnes & Noble 1993.
Scott E. Brodie, An ancient extra-geometric proof, http://www.cut-the-knot.com/pythagoras/Archimedes.html
J L Heiberg (ed.), Archimedes Opera omnia cum commentariis Eutocii (Leipzig, 1910-15, reprinted 1972).
C. Henry Edwards and David Penny, Calculus with early transcendentals, Prentice Hall 1997
J Gray, Sale of the century?, The Mathematical Intelligencer. 21 (3) (1999), 12-15.
James Midgley, USA Today, Science 07/12/00.
William Noel, Richard Leson, Reviel Netz, Lynn Wolfe and Joe McCourt. The Archimedes Palimpsest, http://www.thewalters.org/archimedes/frame.html
Barbara Robson, Archimedes was ahead of his time, The Ottawa Citizen. July 23, 2001.

Barbara Robson, Salvaging the fragile work of Archimedes, The Ottawa Citizen. July 23, 2001.

NAM MATHFEST XI AT FAMU

From October 4,5,6, 2001, NAM's Eleventh Annual MathFest will be held at Florida A & M State University in Tallahassee Florida. This is a three-day weekend undergraduate mathematics research conference to enhance the development of American minority students. The program includes:

- presentations on current research by noted mathematicians
- student presentations on undergraduate research
- exposure to careers in mathematics
- discussion of graduate school issues
- direct contact with graduate school representatives

The J. Ernest Wilkins lecturer this year is Dr. Bernard Mair of the University of Florida.

Bernard A. Mair earned his Ph. D. in Mathematics from McGill University in 1983. He has published 27 papers. A particular inverse problem he has worked on is the modeling of heat flow of rocket plumes. His work in medical imaging includes the development of new methods for PET image formation and deblurring the discrete gaussian. His home page is: http://www.math.ufl.edu/~bam/.

ELECTIONS TO THE NAM BOARD

The three open positions on the Board, Secretary/Treasurer, Region B Representative, and Community College, are all uncontested by the current people in those offices.

Robert Bozeman, Secretary/Treasurer, is Professor of Mathematics, Morehouse College.

Jacqueline Giles, Community College Representative. Biographical Sketch I have participated in projects that benefit two year colleges and Historical Black Colleges and Universities. I believe that I can be instrumental in fostering a stronger collaborative and cooperative relationship between NAM and MAA. I have been a presenter AMATYC, NCTM and other conferences. My experiences have uniquely qualified me to represent and negotiate on behalf of underrepresented groups. I have been mentored by NAM, and I desire that NAM benefit from the wisdom I have gained. Thank you. Prof. Jacqueline Brannon Giles Member, MAA Quantitative Literacy Committee, www.maa.org Board Member, National Association of Mathematicians (NAM) Governor at large, Minority Affairs, Mathematical Association of America (MAA) Board Member, Nigeria Advisory Board - Houston Community College System Member, Council of Nigerian People and Organizations (CONPO).

Mary S. Hawkins, Region B representative, has been a active member of NAM for more than twenty years. She has been employed by Prairie View A&M university for more than twent-five years. During that time served the University in many areas, Mathematics Teacher, Research Scientist for the college of Home Economics and the College of Agriculture, and Coordinator of a Special Project.

A "YOUNG" MATHEMATICIAN EXCELS

Every year NAM has a special one hour lecture at the Annual Joint Mathematics Meetings (AMS, MAA, ASL, AWM, NAM). The lecture is named after W.S. Claytor the fourth African American Ph.D. You can read about Claytor at Mathematicians of the African Diaspora. This January 2002 the meetings will be held in San Diego. The Claytor Lecturer will be Dr. Katherine Okikiolu.

Katherine Okikiolu comes from a mathematical family: Her father is a mathematician who has published more than 200 papers, and her mother is a high school mathematics teacher. Her parents met after her father left Nigeria to study mathematics at the same college in England where her mother was studying physics. In 2000, Okikiolu married to the mathematician Hans Lindblad, who like Katherine, is a professor at the University of California at San Diego (UCSD). During the summer of 2001, she gave birth to a son.

Okikiolu earned her bachelors in Mathematics from Newnham College in England--the only all-women's college remaining at Cambridge University--before coming to the United States in 1987 to attend graduate school mathematics at UCLA. There, she worked with two mentors, Alice Chang and John Garnett, and was able to solve a problem concerning asymptotics of determinants of Toeplitz operators on the sphere and a conjecture of Peter Jones, characterizing subsets of rectifiable curves in Euclidean n-space. She earned her Ph.D. at UCLA in 1991.

Dr. Katherine Okikiolu went, in 1991, to Princeton University where she was an Instructor and later an Assistant Professor, then spent one year at the Institute of Advanced Study. During the fall of 1992 Okikiolu was at Duke University. From 1993 to 1995 she was an Assistant Professor at Princeton University. In 1995, she was appointed Assistant Professor in the Mathematics Department of UCSD, but was a Visitor at MIT in the Spring of 1996. Also in 1996, Dr. Okikiolu spoke as part of the twenty-fifth anniversary celebration for Association of Women in Mathematics.

Katherine Okikiolu's research areas are Classical Analysis, Differential Geometry, Partial Differential Equations and Operator Theory. She has published nine papers in mathematics, the most recent is Critical metrics for the determinant of the Laplacian in odd dimensions. Annals of Mathematics (2) 153 (2001), no. 2, 471--531.

In June 1997, Kate Okikiolu became the first Black mathematician to win the most prestigious award for young mathematics researchers, a $70,000 Sloan Research Fellowship. In 1997, UCSD promoted her to Associate Professor.

Also in 1997, Dr. Okikiolu became the first Black Mathematician to win the $500,000 Presidential Early Career Awards for Scientists and Engineers. One Newspaper report at that time said:

Dr. Okikiolu has been researching the "spectral determinant" of a drum, which is essentially the number obtained by multiplying all the individual sound pitches made from a drum note. This number helps describe the shape of the drum. Although this area

is largely understood in two-dimensional drums, Okikiolu is investigating the more challenging spectral determinant problem for three-dimensional drums. In a separate project, Okikiolu also studies linear distortions of drum notes and other types of signals. Research in this area may have implications for problems in quantum physics. For her work aiding inner-city children, Okikiolu plans to make a series of videos depicting model teaching lessons that emphasize real-world perspectives. Designing model dwellings and bridges, constructing useful articles such as clothing and shelves, mending bicycles and painting pictures are "hands-on" activities that Okikiolu believes can acquaint children with mathematical concepts and help them grasp the significance of numbers and measurements.

THE BEST JOURNAL

by Scott W. Williams

When I was a graduate student, my advisor would go to the mathematics department common room and read/scan each journal as it arrived. In those days I would guess this took up rnals where their strongest articles appear. Each of us should read are own, however, what general journals should we open? Which journals consistently publish only first rate articles? Is there a "best mathematics journal?"

A journal fitting this "best" description would have every article, no matter the field, important and extremely strong. If attention is limited to the U.S., then I would claim that such a journal exists, and it is the Annals of Mathematics published by Princeton. I can say from personal experience, its standards of publication are extremely high. So high that upon occasions very good important articles are rejected. Acta Mathematica (there are several journals by this name) published by the The Royal Swedish Academy of Sciences' Mittag-Leffler Institut is at the same level. It is questionable whether there are others in the world at this class, even the oldest mathematics journal, known as Crelles Journal, is not so lofty.

Which of us has published in these journals? Not me. I only know of seven papers published in these journals by people of African descent. There are three by David Blackwell, two by W. W. Schliefelin Claytor (after whom NAM's Claytor Lecture is named), and one by each of Georgia Tech's Wilfrid Gangbo and UCSD's Katherine Okikiolu. I list them chronologically below.

1. Schiefelin Claytor, Topological Immersion of Peanian Continua in a Spherical Surface, The Annals of Mathematics, 2nd Ser. 35, 1934), 809-835
2. Schieffelin Claytor, Peanian Continua Not Imbeddable in a Spherical Surface, The Annals of Mathematics, 2nd Ser. 38 (1937), 631-646.
3. Blackwell, David, Idempotent Markoff chains, The Annals of Mathematics, 2nd Ser. 43, (1942). 560--567.
4. Blackwell, David, Finite non-homogeneous chains, The Annals of Mathematics, 2nd Ser. 46, (1945). 594--599.
5. Bellman, Richard; Blackwell, David On moment spaces. The Annals of Mathematics, 2nd Ser. 54, (1951). 272--274.
6. Gangbo, Wilfrid; McCann, Robert J. The geometry of optimal transportation. Acta Math. 177 (1996), no. 2, 113--161.
7. Okikiolu, Katherine. Critical metrics for the determinant of the Laplacian in odd dimensions. The Annals of Mathematics, 2nd Ser. 153 (2001), no. 2, 471--531.

SUPPORT AMUCHMA

For 24 issues, the African Mathematical Union's Commission on the History of Mathematics in Africa (AMUCHMA) has revealed new and interesting mathematical material to the world of history, archeology, and education. The reproduction and distribution of the first 24 issues of the AMUCHMA Newsletter counted with the generous support from the Research Department of the Swedish International Development Agency (SIDA-SAREC). The contract with SIDA-SAREC came to an end and there is a call for support financially AMUCHMA's activities and/or to suggest alternative sources of financing.

Thanks to Scott Williams, the English language edition of all issues of the AMUCHMA Newsletter is also accessible for free on the following website: http://www.math.buffalo.edu/mad/AMU/amuchma_online.html

CAARMS 7 REPORT

The Seventh Conference for African-American Researchers in the Mathematical Sciences (CAARMS7) was held June 19-22, 2001 at Duke University. An inspirational keynote address was given by Dr. Freeman Hrabowski, president of the University of Maryland, Baltimore County on the best practices in producing high-achieving African American students in mathematics.

The invited researchers who each made hour long presentations on their work included: Shea Burns, North Carolina A&T University; Garikai Campbell, Swarthmore College; Jamylle Carter, Institute for Mathematics and its Applications (IMA); Gelonia Dent, IBM T.J. Watson Research Center - Yorktown; Illya Hicks, Texas A&M University; Tasha Inniss, Trinity College; Otis Jennings, Stanford University; Wole Soboyejo, Princeton University; Alain Togbe, Greenville College; Kimberly Weems, National Security Agency.

Twenty graduate students had the opportunity to present their work at the CAARMS7 graduate poster session on topics ranging from predator-prey models and algebraic geometry to internet admission control schemes and quantum Monte Carlo integration. The strong influence of Dr. Hrabowski was felt at this session since 4 of the 20 participants were his former students.

At the CAARMS7 banquet, Dr. Melvin Currie of the National Security Agency gave an address about the importance of listening to your inner voice in pursuing a career in mathematics. Finally, three tutorials were presented at CAARMS7 in algorithmic design, stochastic differential equations and mathematical finance, as well as gravitational lensing by (respectively) Drs. Jeffrey Forbes, Duke University; Dr. William A. Massey, Bell Labs and Dr. Arlie O. Petters, Duke University.

The organizers of the CAARMS7 event were Drs. Massey, Petters and Leon Woodson of Morgan State University. The sponsors of the event were the National Security Agency, Duke University and Morgan State University.

Special thanks to Dr. Michael Reed of Duke University who graciously gave us an impromptu presentation on mathematical biology. A special thank you also to Dr. Alfred Noel of the University of Massachusetts at Boston who was the lead editor of the third volume of CAARMS proceedings and was assisted by Drs. Earl Barnes and Sonya Stephens.

Abstracts of the talks and poster presentations can be found at the CAARMS7 website http://cm.bell-labs.com/who/will/caarms7.html. Plans are being made to hold CAARMS8 next June of 2002 at Princeton University. For more details, contact Dr. William Massey at wmassey@princeton.edu.

Photo captions

Photo1: CAARMS7 speaker Dr. Otis Jennings and CAARMS7 organizers Drs. Arlie Petters and William A. Massey

Photo2: CAARMS7 graduate student poster presenter Michael Madison of Stanford University

Photo3: CAARMS7 graduate student poster presenter Robert Hampshire of Princeton University

Photo4: CAARMS7 keynote speaker Dr. Freeman Hrabowski, president of the University of Maryland, Baltimore County

Photo5: Six graduates of the Meyerhoff scholarship program attending CAARMS7 and introducing Dr. Hrabowski

Photo6: Attendees at the CAARMS7 banquet including CAARMS7 speaker Dr. Shea Burns

Photo7: CAARMS7 speaker Dr. Wole Soboyejo of Princeton University

Photo8: CAARMS7 speaker Dr. Alain Togbe of Greenville College

Photo9: CAARMS7 speaker Dr. Jamylle Carter of IMA

Photo 1

Photo 2

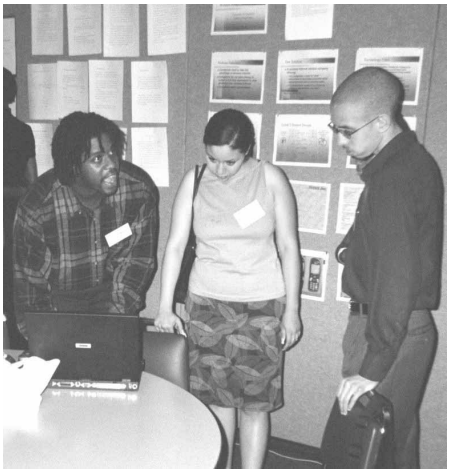

Photo 3

Photo 4

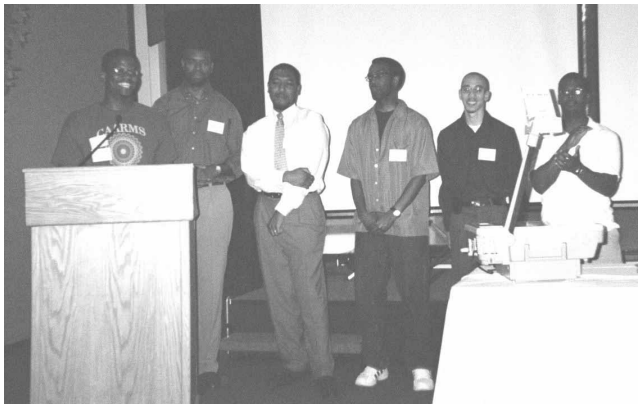

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Photo 6

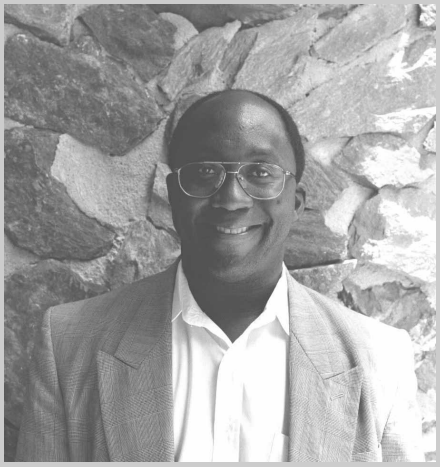

Photo 7

Photo 8

Photo 9

DAVID BLACKWELL LECTURER

Carl Graham gave the David Blackwell lecture at the MAA MathFest this summer.

Title of Talk: Limit theorems for a large network in which customers join the shortest queue among several.

Abstract: An important idea in communication networks is the pooling of resources so as to better utilize them. We consider a queuing network introduced by Vvedenskaya et al. to illustrate this. Customers arrive at rate proportional to N on a system of N single server infinite buffer queues, are allocated a subset of L queues uniformly at random, and join the shortest queue in this subset. Service is independent at each queue and at a fixed rate. The large N limit is considered for this mean-field model, first in a transient regime in which the initial conditions are assumed to converge, and then in equilibrium. The improvement in performance is quantified precisely at the limit : the stationary probability of having a given queue size, or of having the average queue size in the network, above some threshold, decreases super-exponentially in the threshold as sooon as L>1, whereas it decreases exponentially in the case L=1 corresponding to independent queues. Powerful tools of probability theory are used in this context, notably non-linear martingale problems, tightness estimates, and compactness-uniqueness methods. The study in equilibrium considers first the dynamic evolution and its large N limit, and then an inversion of limits between large N limits and long time limits is performed for the study in equilibrium.

Here is a brief biography on Dr. Graham: Born in the USA, emigrated to France as a child. Former student of the Ecole Normale Superieure. "Agregation de Mathematiques". Thesis and "Habilitation a Diriger les Recherches" in Mathematics at the "Laboratoire de Probabilites" at the Universite Paris 6. Researcher at the Centre National de la Recherche Scientifique (CNRS), in a laboratory at the Ecole Polytechnique. Currentlya teacher at the Ecole Polytechnique.

THE MIAMI UNIVERSITY SUMSRI REPORT

The Summer Undergraduate Mathematical Sciences Research Institute (SUMSRI) is now underway. Sponsored by the Department of Mathematics and Statistics and led by Drs. Vasant Waikar and Patrick Dowling, SUMSRI is an intensive research opportunity for undergraduate students majoring in the mathematical sciences sponsored by Miami University, the National Security Agency and the National Science Foundation. On June 3, fifteen students from as far away as California, Puerto Rico, Maryland and Texas converged on Oxford, OH to study, conduct research and have a bit of fun. Their time at Miami is well spent. Besides doing research statistics, algebra or graph theory, they also take courses in abstract algebra and real analysis. Mini-courses in GRE preparation and technical writing prepare these students for the rigors of future graduate education. Colloquium speakers and discussions on careers and mathematics, choosing a graduate school and financial aid, help students to think concretely about the graduate school option. The SUMSRI program lasts seven weeks.

SUMSRI is a research experience for undergraduates designed to provide its participants with an opportunity to explore the option of a graduate education. Since women and minorities are currently underrepresented in the mathematical sciences, SUMSRI draws the majority of its participants from these groups. SUMSRI tries to emulate the entry-level graduate experience including course work, research concepts and time to meet with faculty informally. At the same time, SUMSRI offers an environment that demystifies the graduate application process including information on how to find a graduate school that is appropriate for each student, funding sources and the many career paths opening up to mathematicians and statisticians. In this way, the institute hopes to address the shortage of minorities and women as mathematical research scientists.

After students leave the institute, they are encouraged to stay in contact through email, follow-up evaluations and informal gatherings during national mathematics meetings. This past January, seven participants from SUMSRI 2000 attended the national AMS-MAA-SIAM Mathematics meetings in New Orleans, and gave poster presentations of their research.

"I have enjoyed the program so far, and I am getting a taste of what graduate school is really like. It is a challenging and rewarding experience surrounded by great professors and a group of wonderful new friends."-Jennifer Everson
SUMSRI is already preparing for the summer of 2002. We seek talented undergraduate students in the mathematical sciences who are interested in pursuing advanced degrees. Because of the shortage of minorities and women mathematical scientists, we are specially interested in, but not limited to, African Americans and other underrepresented minorities and women. For more information, see the website: http://www.muohio.edu/sumsri/.