

## Doris Schattschneider Visits

by Mark Kayll

Doris Schattschneider, Professor of Mathematics at Moravian College, Bethlehem, Pennsylvania, paid UM a visit and delivered two of the most exciting and memorable lectures in the recent history of the Department of Mathematical Sciences. On September 11, she presented *Ingenious Mathematical Amateurs: M.C. Escher (artist) and Marjorie Rice (homemaker)* to a riveted crowd of 300 in the Music Recital Hall. The next day she spoke on *Escher's Combinatorial Patterns* in the department's colloquium. Based on the enthusiasm generated by the first lecture, it is probably not a coincidence that the second was standing-room only!

Our distinguished visitor received masters and doctoral degrees in mathematics from Yale University. Her dual interest in geometry and art led naturally to the study of tiling problems and the work of the Dutch artist M.C. Escher. In addition to authoring many scholarly articles on plane tiling, Prof. Schattschneider has acted as "Boswell" to reveal to the professional world the mathematical investigations of Marjorie Rice and M.C. Escher. One work she co-authored, a book and collection of geometry models (*M.C. Escher Kaleidocycles* [Pomegranate Artbooks, 1987]), has been translated into 16 European languages! Her book [DS90] on Escher, was supported by the National Endowment for the Humanities. She has also published numerous articles about Escher's work, including three listed as references: [DS94], [DS97] and [MWS97].

Prof. Schattschneider was the keynote speaker for the third annual Big Sky Combinatorics Conference

(see related article). Her visit was also a timely event for students in the three pilot sections of Math 107, *Contemporary Mathematics*. One of the topics of this new reform course is symmetry, as seen, for example, in wallpaper patterns, parquet floors, brick buildings, faces, and flowers. Symmetry was a primary focus of Prof. Schattschneider's two lectures. At the first of these, this focus offered a clear illustration to the many Math 107 students in attendance that mathematics has rich connections to their lives outside the classroom. What better way to drive this point home than to discuss the work of the two mathematical "amateurs" Marjorie Rice and M.C. Escher! [For more on the Escher, Rice talk, see the Kaimin article reprinted here with permission from (and thanks to) author Tom Greene.]

The second lecture, *Escher's Combinatorial Patterns*, was a memorable chapter in the department's colloquium series. To convey the flavor of this talk, a problem Prof. Schattschneider posed to motivate her discussion is repeated here. With the kind permission of the author, the quoted passages and graphic images are taken from [DS97].

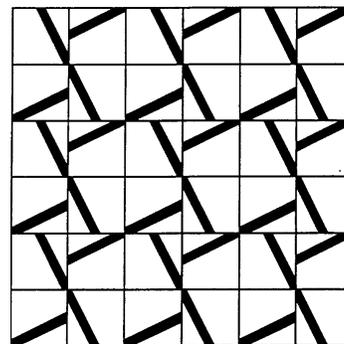
"Take a square and place inside it some design; we call such a one-square design a *motif*. Then put together four copies of the decorated square to form a  $2 \times 2$  square array. The individual decorated squares in the array can be in any *aspect*, that is, each can be any rotated or reflected copy of the original square. Finally, take the  $2 \times 2$  array (which we call a *translation block*) and translate it repeatedly in the directions perpendicular



Doris Schattschneider

lar to the sides of the squares to fill the plane with a pattern."

The accompanying graphic provides examples of a motif, in four rotated aspects, a (schematic) translation block, and the resulting tiling of the plane.



"At some point Escher asked himself the question: *How many different patterns can be made with a single motif,*

see 'Schattschneider' page 7

## Notes from the Chair's Desk

It is still warm for this time of Fall in Missoula and leaves are just beginning to turn into the reds and oranges that make the Fall such a beautiful time of year. We want to hear from you. Send us your ideas about things you would like to know about the Department and on articles you would like to see included in this newsletter. As you will see from other articles in this issue, changes are still happening within the Department.

◆ We are pleased with the gifts and grants that have come to the Department. More than four million dollars in grants are attributable to the academic year 1996-97. Our Fall departmental retreat took place the second week in October. This provided an opportunity to have lengthy discussions on issues important to the well-being of the Department. This year our discussions centered on departmental fundraising needs. I will tell you about this and our gifts in the Spring issue.



◆ Last Fall, the Mathematics Building was in a depressing state, but we went to work trying to get our building renovated. This renovation project took the entire Summer and is likely to last through next summer. In addition to some construction work done here and there, our two computer labs are now air conditioned and house many new computers. Beautiful new outside front and back doors have been installed. Windows, painted shut for many years, can now be opened and screens have been installed. We no longer have to compete with the Spring and Summer activity of bees and can enjoy the fresh summer air. The interior of the building has been painted in various pastel colors and classrooms have been equipped with whiteboards. Elimination of the vast amount of chalk dust that accumulates is doing wonders for the air and technology equipment in the building. Next summer will see a concentration on the renovation of classrooms. This will include a new classroom in the Liberal Arts Building for our mathematics education courses.

◆ Last Spring I told you about the new sofa donated by the late Barbara Reiman for the Undergraduate Study Room. I also told you that we have established a fund in her honor to receive contributions to redecorate this room. Last Spring, the American Legion, Fort Owen Post No. 94, Stevensville, MT, made a generous gift to Pi Mu Epsilon (the national mathematical honorary society) in honor of Barbara Reiman. This gift helped the members of this honorary

and the local student chapter of The Mathematical Association of America to select and place a very nice new chair, with matching ottoman, in this room. We still have much to do in refurbishing the room, but we are hopeful that this project can be completed this year.

◆ Professors Jennifer McNulty and Greg St. George were promoted to associate professor; professors James Hirstein and Karel Stroethoff were promoted to full professor. Professor William Derrick is on sabbatical leave this year and Professor Leonid Kalachev is spending the year at Toyo University through the faculty-exchange program. We have three new visiting assistant professor with us: Professors Patricia Hale (mathematics education), Steven Liedahl (algebra), and William Long (applied mathematics).

You are always welcome to visit with us and see how we are doing.

*Gloria C. Hewitt*

### **Faculty:**

Gloria C. Hewitt, *Chair*  
David Patterson, *Assoc. Chair*

Rick Billstein, *Mathematics Education*  
Mary Jean Brod, *Secondary Mathematics*  
William Derrick, *Applied Mathematics*  
Rudy Gideon, *Statistics*  
Jonathan Graham, *Statistics*  
Gloria C. Hewitt, *Algebra*  
James Hirstein, *Mathematics Education*  
Leonid Kalachev, *Applied Mathematics*  
Mark Kayll, *Operations Research*  
Libby Krussel, *Mathematics Education*  
Don Loftsgaarden, *Statistics*  
Johnny Lott, *Mathematics Education*  
Jennifer McNulty, *Operations Research*  
George McRae, *Operations Research*  
David Patterson, *Statistics*  
Greg St. George, *Functional Analysis*  
Karel Stroethoff, *Complex/Functional Analysis*  
Thomas Tonev, *Complex/Functional Analysis*  
Nikolaus Vonessen, *Algebra*  
George Votruba, *Functional Analysis*  
Keith Yale, *Complex/Functional Analysis*

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Please send mailing list updates  
and/or address changes to  
Michelle Johnsen, Secretary,

## Big Sky Conference is a Success

The third annual Big Sky Combinatorics Conference was hosted by the Department of Mathematical Sciences from September 11-13, 1997. Following similar themes of its two predecessors that also took place at UM, the conference focussed on Geometry, Discrete Math, and Algorithms.

The event kicked off with a keynote address by Professor Doris Schattschneider of Moravian College, who presented a multi-media lecture entitled *Ingenious Mathematical Amateurs: M.C. Escher and Marjorie Rice*. The talk, aimed at a general audience, drew a crowd of about 300 representing a wide cross-section of the Missoula community. Prof. Schattschneider did not disappoint the crowd! Her talk informed, moved, humbled, and inspired a spellbound collection of viewers. [See the article below on Prof. Schattschneider's lecture.]

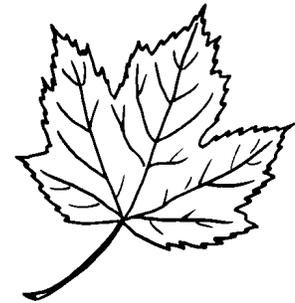
Other conference events included eleven contributed papers spread over two days and a well-attended colloquium talk by Prof. Schattschneider. Presenters traveled from various locations in Montana (Western Montana

College-Dillon, Montana Tech-"Butte, America," and MSU Northern-Havre), as well as from out-of-state (Washington State University, Pullman) and even from Canada (The University of Calgary)! "The overall quality of the talks was superb," said Professor Jenny McNulty, the principal organizer, who went on to explain that one main purpose of the meeting is to bring together researchers, from the geographical vicinity, who share interests in the focus areas of the conference. McNulty and colleague Mark Kayll share the responsibilities of organizing the event, with each taking the lead in alternate years. "We started small, but the idea caught on quickly," reflected Kayll; "Big Sky Combinatorics improves every year, and we're already anticipating the 1998 edition." Based on the tremendous success of this year's event, the Department of Mathematical Sciences is looking forward to the 4th installment of the Big Sky Combinatorics Conference!

## Visitor from Kazan

by Keith Yale

The University of Kazan, Russia, was home to N. I. Lobachevsky and Non-Euclidean Geometry in the 19th century. Today it is a major Russian mathematical center. The Department of Mathematical Sciences was fortunate to have Professor Suren A. Grigoryan, a distinguished analyst from the University of Kazan, visit for two weeks in September. Professor Grigoryan delivered five lectures (in Russian) on various topics in the general areas of uniform algebras and generalized analytic functions. Several members of the department are actively doing research in these areas and they found his lectures most exciting. His visit was sponsored by Professor Thomas Tonev with a grant from the National Research Council.



## Rice, Escher lecture appeals to all

by Tom Greene, Reporter  
*Montana Kaimin*, Sept. 12, 1997

It's not often you find art and math students sitting side by side at a lecture.

The left side and the right side of the brain got together last night at a lecture in the Music Recital Hall given by author and Professor Doris Schattschneider on the ingenious Mathematicians, M.C. Escher and Marjorie Rice.

M.C. Escher was a Dutch graphic artist whose pictures incorporate high mathematical concepts of symmetry.

Marjorie Rice was an unknown San Diego homemaker whose discoveries of 56 different mathematical tilings sprang from her interest in the

games section of her son's math magazine.

The visiting scholar lecture was sponsored by the Art Department, Women's Studies Program, and Department of Mathematical Sciences. The diverse group of sponsors parallels Schattschneider's speech dealing with how different fields of study can complement each other.

"Too often fields of study can be too narrowly focused," said Schattschneider. "We need to encourage amateurs...or as I like to call them, outsiders."

Schattschneider stressed the importance of visualizing information and encouraging outsiders.

"M.C. Escher had no mathematical sense as a student," said

Schattschneider. "Neither of them (Escher or Rice) had any formal mathematical training. They visualized it in pictures instead of symbols." Escher and Rice both worked on their mathematical problems alone and in their own way, said Schattschneider. They each tackled problems that ask which types of shapes can tile the plane, and in what manner. Their fresh insight made for remarkable contributions in the field of mathematics.

"It is illuminating to see how each made the mathematical problems their own," said Schattschneider, "asking questions in a way that made sense to them, without particularly caring how mathematicians might approach the problem."

## Graduate Mathematics Courses for Summer

by Jim Hirstein and Libby Krussel

The Mathematics Education faculty have redesigned the MAT program so a teacher may complete the Master's program in two summers and one academic year. (Note: Summers only is still an option.) Students in the program will be strongly considered for academic year Teaching Assistantships and are encouraged to apply.

We will be offering more courses during summer sessions, and on a new, improved schedule: three courses, nine credits, starting **June 15th**. This summer ('98), the Department is offering three 3-credit graduate MAT courses on a **Monday-Thursday** schedule, taught by Jim Hirstein and Libby Krussel:

MATH 501 *Technology in Mathematics for Teachers*. June 15 - July 30. This class will meet for 90 minutes each day, in the afternoons in our air-conditioned computer lab.

MATH 526 *Discrete Mathematics for Teachers*. June 15 - July 7. This class will meet for 3 hours each day in the mornings.

MATH 510 *Problem Solving for Teachers*. July 8 - July 30. This class will meet for 3 hours each day in the mornings.

For more information about the MAT program in general, or about these courses, please contact Jim Hirstein at 406/243-2661, e-mail [hirstein@selway.umn.edu](mailto:hirstein@selway.umn.edu), or Libby Krussel at 406/243-4818, e-mail [krussel@selway.umn.edu](mailto:krussel@selway.umn.edu).

## SIMMS IM Is Progressing

By Johnny Lott, Co-Director

The original Systemic Initiative for Montana Mathematics and Science (SIMMS) Project ended with its final report in May 1997. As the SIMMS Project ended, the National Science Foundation (NSF) funded the SIMMS Integrated Mathematics (SIMMS IM) Project to complete the revising of the senior level materials and to have the material tested in El Paso and in Cincinnati.

Revision is taking place on the University of Montana campus with the responsibility for the testing in El Paso and Cincinnati under the supervision of the Montana State University-Bozeman campus. All work will be complete by August 1998.

In addition to the SIMMS IM grant, a grant was received by the Montana Council of Teachers of Mathematics (MCTM) to participate in dissemination of the SIMMS materials through Ithaca College. Gary Bauer, formerly of C. M. Russell High School, has been hired to direct the dissemination efforts. Gary is at 401 Linfield Hall on the MSU-Bozeman campus.

SIMMS IM materials, published by Simon & Schuster Custom Publishing Company are being used throughout the United States. They have been chosen for adoption in Texas in the nonconforming status so that schools may use state money to purchase materials but they do not meet 100% of the Texas elements required for adoption. (They met all but 5 of the 114 elements.) MCTM is also negotiating foreign rights to the curriculum.

Inservice efforts are continuing with the design of three one-week courses. The Integrated Mathematics using the TI-92 is a Teachers Teaching with Technology (T<sup>3</sup>) course developed with Texas Instruments. The Integrated Mathematics Methods Institute includes examples of both content and methods for an integrated curriculum. The Integrated Mathematics Assessment Workshop deals with alternative assessment in a reform curriculum. All of these institutes have been piloted. The first two have now "gone on the road." The last will go on the road next year. If you have questions, call 406/243-2696.

## STEM Project Almost Complete

by Rick Billstein, STEM Director

The six year \$4 million NSF-funded Six Through Eight Mathematics (STEM) project will be complete as of December 31, 1997. This coincides with the commercial publication of the middle school mathematics curriculum materials by McDougal Littell/Houghton Mifflin. Schools can expect all three grade levels (6-8) to be on display at the National Council of Teachers of Mathematics (NCTM) Annual meeting in Washington DC in April, 1998.

This late publication date has not stopped many schools around the nation from adopting STEM for the school year 1997-98. Students will use field test materials until commercial materials are available and then make the switch. Students seem happy with this situation because they finally get a chance to write in their math books until the new ones arrive.

With STEM funding ending, other grants are being pursued. Funding was just announced for the NSF-funded ShowMe grant. This is a \$6 million grant for national awareness of the new middle school mathematics curricula projects. The ShowMe project will be centered at the University of Missouri with a working site in Missoula. Jim Williamson and Rick Billstein will work half time for ShowMe for the next five years. Another proposal called STEMIC was submitted on September 1, 1997 to work with teacher enhancement throughout the nation using the STEM materials as the professional development tool. The fate of this proposal will be known around the first of the year.

STEM will continue operations from the STEM office in Missoula for the next five years. If you have questions you can call 406/243-2659 or visit the STEM web page at <http://www>.



# Profile of a Montana Mathematician - Charles Bryan

by Rudy Gideon

Charles Bryan was born in 1936 in Livingston, Montana where he spent his entire childhood through high school. He became interested in science under the mentoring of his physics-chemistry teacher Don Holmquist, who was able to inspire all of his students.

When Charles graduated from high school in 1954, he attended Montana State College-Bozeman and majored in Engineering Physics. He graduated in 1958 and somewhere along the way developed an interest in mathematics. His interest in mathematics led him to accept a graduate fellowship (NDEA) offer at the University of Arizona in Tucson.

In the summer of 1956, Charles married Cynthia, his high school sweetheart and classmate in Livingston. Cynthia also attended Montana State College and after a year, became a secretary for the Northern Pacific Railroad. Two of their children, Mike and Gary, were born in Montana. Their third child, Julia, was born in Arizona.

While in Arizona, Charles became interested in applied mathematics. Mel Lieberstein, a mathematics professor, told Charles he wasn't smart enough to get through graduate school. In response, Charles translated an abstract Italian partial differential equation paper for Prof. Lieberstein. Prof. Lieberstein was impressed, took Charles under his wing and Charles went on to earn a Masters Degree and Ph.D. in mathematics with a dissertation in numerical analysis. Charles was the second Ph.D. student in mathematics at Arizona.

His varied degrees gave Charles the opportunity to work at Cape Canaveral in the budding aeronautical industry as the head numerical analyst. However, he preferred Arizona State University at Tempe where he was able to teach calculus as a tenure track faculty member. He started teaching for a salary of \$8,000 when he could have earned \$20,000 in industry.



Charles Bryan, circa 1980

His choice proved to be the correct one as he continued to be happy with his teaching career.

After 3 1/2 years at Tempe, Charles and his wife came to Montana in the fall of 1966 to be closer to family. The University of Montana had just started a Ph.D. program and Charles wanted to be a part of it. Charles produced the second Ph.D. student in math at UM while Professor Bill Myers was chair of the Mathematics Department. This student, Charles Schelin, was the first of his four Ph.D. students, the others being Dan Hanson, Dick Woods, and Hashim Saber. They all went on to teach at colleges throughout the United States.

In 1973, Charles became chair of the department and remained so until 1975. He served a second term as chair from 1981-1984. Charles became interested in the activities of the University Teacher's Union and became a member of the bargaining team. He was chief bargainer during 1979-1980 and became president of the union the next year. This was one of the few times that faculty received adequate raises.

Charles points out that in 1906, the University of Montana president complained about low faculty salaries and that nothing much has changed since then. As a native Montanan, Charles feels University funding is too low and that faculty and students do not get the respect they deserve from the state legislature and Board of Regents.

Charles helped the mathematics department grow from 12 faculty and a handful of graduate teaching assistants in 1966 to more than 16 faculty members and 16 teaching assistants by 1975. Dr. Bryan decided to retire from The University of Montana in the spring of 1989 with 23 years of service in the Department.

After retirement, Charles and his ever-devoted wife have been co-owners and operators of Gillespie Realty in Missoula and have been annual "Pacesetters" of the UM Foundation. They have always designated their contribution for academic departments including the Department of Mathematical Sciences.

Charles has been a Boston Red Sox fan ever since the Ted Williams days and has added to his interests the Denver Broncos and the Chicago Bulls. He continues to enjoy and support Grizzly athletics as an active Grizzly Athletics Association (GAA) and Quarterback Club member.

## 1997 Undergraduate Degrees Awarded in Mathematics

Guy Randall Atkins  
 Kent Dennis Barbian  
 Michelle Marie Crepeau  
 Galadriel Elisha Gardner  
 Katharine Lynn Gray  
 Kelvin D. Gulling  
 Sanna Dee Halverson  
 Rachael Marie Hasquet  
 Shawn Robert Huse  
 Christine Jorgenson King  
 John J. Kozlowski  
 Kevin John Lielke  
 Michael James Marcinkowski  
 Takehiko Nemoto  
 Elizabeth Marie Olney  
 Virginia Elizabeth Perkins  
 Megan April Rehe  
 Joel Edward Silverman  
 William Joseph Sullivan  
 Larry Francis Tofanelli  
 Daqi Tu

## Arcadia Highlight of Math Awareness Week

by Dave Patterson

The Department of Mathematical Sciences celebration of Mathematics Awareness Week April 21-25 was a resounding success. On Tuesday, April 22, Professor Wieslaw Zelazko gave a fascinating talk on the history of Polish mathematics. On Wednesday, we had our annual awards ceremony in which a number of scholarships and prizes were given to undergraduate and graduate math students; see the list below of awards winners. On Friday, Professor Lynn Churchill used a live teleconference video link with a Network Montana Project colleague at Montana State University-Bozeman to demonstrate how users in different locations can interact electronically, sharing software, interactively working on projects or with students in a remote class.

Thursday was the highlight of the week's events - the staged reading of excerpts from Tom Stoppard's play *Arcadia* in the Masquer Theater. More than 100 people attended. It is a very funny play, particularly for people who know some mathematics. The interchanges between the tutor Septimus, played by Michael Verdon, a professional actor from Helena, and his young student Thomasina, played by education professor Georgia Cobbs, were particularly funny. Other roles were excellently performed by mathematics professors Jim Hirstein, Mark Kayll, Libby Krussel and Johnny Lott, education professor



Arcadia cast photo

David Erickson, students Debra Dix, Lisa Fosbender, Mikhael Farah and math educator Margery Palmer. Music was provided by math graduate students Paul Olson and David Babcock. The reading was directed by Bob Baker, who received his M.A.T. from the math department in 1996. In fact, this reading of the play inspired the UM Drama Department to offer a full-scale production of *Arcadia* for the 1997-98 season on December 9-13 (our actors are, unfortunately, still waiting for their audition calls from the Drama Department).

The weather cooperated for the spring picnic on Friday, so blankets and winter coats were not necessary as they had been the previous two years. The softball game ended in another victory for the faculty over the students (ho-hum).

## 1997 Mathematics Scholarship and Award Winners

- Joseph Hashisaki Memorial Scholarships (for two outstanding upper division math majors): Linda Burrington and Catherine Murray
  - Hartley E. Taylor Memorial Scholarship (a one-time award for an upper-division math major): Kathy Breland
  - Mac Johnson Family Scholarships (for students who have completed at least one semester of calculus and shown exceptional talent in mathematics): Jennifer Berg, Neal Chase, Kendra Eyer, Michele Heyn, Shinya Kurebayashi, Noriyuki Sugiyama, and Travis Togo
  - N.J.Lennes Awards (cash prizes based on performance on a competitive exam): (1st) Nicholas Eriksson, (2nd) Noriyuki Sugiyama, Joe Christensen, Jay McCleery, and Hidekatsu Takezawa
  - John A. Peterson Mathematics Education Award (book award to outstanding senior in mathematics education): Sanna Halverson
  - Undergraduate Teaching Scholar (works with a professor to improve a class): Travis Togo (Greg St. George, faculty mentor)
  - Undergraduate Tutorial Scholars (assists students in a lower-level course): Jennifer Berg and Kendra Eyer
  - Graduate Student Distinguished Teaching Awards (cash awards to two outstanding teaching assistants): Talal Al-Hawary and Chris Clouse
- University-wide scholarships and awards to math majors:
- Bertha Morton Graduate Scholarship: Paul Duffy
  - President's Senior Recognition Awards: Kent Barbian and Sanna Halverson
  - Minority Achievement Recognition Award: Anthony Navarro
  - Sigma Xi Senior Award: Michelle Crepeau
  - Watkins Scholars for 1996-97: Kathy Breland, Michelle Crepeau, Laura Sliter and Daqi Tu
  - Phi Kappa Phi Honor Society: Kent Barbian, Linda Burrington, Sanna Halverson, Michele Heyn and Catherine Murray
  - Phi Kappa Phi Undergraduate Research Symposium: Virginia Perkins

# Schattschneider

continued from page 1

following the rules of the game? In order to try to answer the question, he restricted the rules of choice for the four aspects of the motif that make up the  $2 \times 2$  translation block. (Definition: Two motifs have the same aspect if and only if they are congruent under a translation.)”

The easier of the two sets of rules that Escher considered stipulates that “the four choices that make up the translation block are each a direct (translated or rotated) image of the original motif.”

“At first it may seem as if Escher's question . . . can be answered by simply multiplying the number of possibilities of each square in the translation block.” This counting yields  $4^4 = 256$  different ‘signatures’ for patterns that can be produced. “Yet symmetries relate the different aspects of the motif in a translation block and each pattern has additional periodic symmetry induced by the repeated horizontal and vertical

translations of the translation block. These symmetries add a geometric layer of complexity to the combinatorial scheme.”

We are ready to pose Escher's question to the reader. Following the rules of the game outlined above, **how many different patterns are there?** (Two patterns are considered the same if one can be made to coincide with the other by an *isometry*, i.e., a distance-preserving transformation of the plane.) The answer is printed at the end of this article; for a solution, see [DS97], available at the URL [http://www.zblmath.fiz-karlsruhe.de/e-journals/EJC/Volume\\_4/wilftoc.html](http://www.zblmath.fiz-karlsruhe.de/e-journals/EJC/Volume_4/wilftoc.html).

Escher was able to answer his question; can you? Those of us for whom the answer is “no” can take consolation in the fact that M.C. Escher was a remarkable genius with a tenacious spirit. No doubt, his gifts as an artist were already well-known to many members of the audiences at the lectures by our distinguished visitor. We have Professor Schattschneider to thank for introducing us to Escher, the mathematician.

## REFERENCES

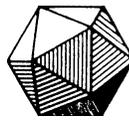
- [DS90] Doris Schattschneider, *Visions of Symmetry: Notebooks, Periodic Drawings and Related Work of M.C. Escher*, W.H. Freeman, 1990.
- [DS94] Doris Schattschneider, Escher's metaphors, *Scientific American* (November 1994).
- [DS97] Doris Schattschneider, Escher's combinatorial patterns, *The Electronic Journal of Combinatorics* **4(2)** (1997) #R17.
- [MWS97] Rick Mabry, Stan Wagon and Doris Schattschneider, Automating Escher's combinatorial patterns, *Mathematica in Education and Research* **5(4)** (1997).

Financial support for Professor Schattschneider's visit was provided by a Visiting Scholar Grant from the Faculty Development Program and is gratefully acknowledged.

Answer: 23



## $\pi\mu\epsilon$ /MAA Math Club Corner



Well it is the beginning of a new year which means it is the beginning of a new busy season for the Pi Mu Epsilon/MAA Math Club. We have the usual exciting plans made and several new ideas in the making. Besides inviting off-campus speakers, we have scheduled informal talks from different members of the mathematics department (including professors, graduate and undergraduate students). We have not, however, completed our schedule for the year so if anyone out there has any ideas or would like to come in and talk to the club we would be most happy to have you (contact M.J. Brod, K. Yale, or any of the student members); and remember, as always, everyone is welcome to come and see what we are doing. Our meeting time is 2:10-3:00pm, Thursdays, in Davidson Honors College 118.

This year, besides participating in weekly seminar meetings, the Pi Mu Epsilon/MAA Math Club is becoming more active in the “workings” of the Department of Mathematical Sciences. We think that it is a good idea that the students who are active in the department to have a voice in the department. We have presented proposals to the department on how students would like to see some of the department's allocations used. We also will be active in the instructor evaluation process and will be in contact with various departmental committees as the need arises.

Overall the UofM Math Club is thriving. We are all looking forward to what we can accomplish both per-

sonally and for the mathematics department as a whole.

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### Currently Active $\pi\mu\epsilon$ /MAA Math Club Members include:

Jenn Berg, Pres.	Michele Heyn
Kendra Eyer, V.P.	Kathryn Hughes
Will Seward, Sec.	Dan Lochridge
Travis Togo, Tres.	Lisa Morgan
Leslie Berg	Todd Oberg
Vicki Bryant	Andrew Zauner

### Faculty Advisors:

Mary Jean Brod	Keith Yale
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back: Kendra, Will, Leslie  
middle: Dan, Andrew, Jenn, Michele, Vicki, Lisa, Mary Jean

## Colloquium Highlights from Spring 1997

by George Votruba

Our active Colloquium Series included speakers from the Polish Academy of Sciences, the NASA Goddard Flight Center, and the International Heart Institute of Montana.

Professor Wieslaw Zelazko from the Institute of Mathematics of the Polish Academy of Sciences, Warsaw gave the talk "A Short History of Polish Mathematics". He described how a country with practically no mathematical traditions and without independence for about 120 years created, in the early 1920's, two fine mathematical schools, the Warsaw School (set theory, foundations of mathematics, topology) and the Lwow School (functional analysis). Most of his talk focused on the Banach (Lwow) school. He mentioned the large number of prominent mathematicians who perished during WWII. His talk was

given during the Department's celebration of national Mathematics Awareness Week, April 20th-26th.

In May, Dr. Richard W. Stewart from the NASA Goddard Flight Center gave the talk "Nonlinearities in Atmospheric Chemistry: A Comparison of Models and Methods". He discussed some methods of possible value in studying steady state solutions of simplified models.

Also in May, The President of the International Heart Institute of Montana, Professor Carlos M.G. Duran, M.D. talked on "The Aortic Valve: a common surgical problem but unknown mechanism". He emphasized that a precise understanding of the normal aortic valve - both of its geometry and its function - is essential, and that mathematical input into this work is required. The following week, department members Dick Lane, George

McRae and Greg St. George started an on-going consultation with Dr. Duran. The International Heart Institute of Montana is a joint venture between St. Patrick Hospital and The University of Montana and is expected to make Missoula a household name among heart surgeons around the world.

### Colloquium Calendar

- 10/23 Prof. Mihai Caragiu  
Washington State University  
*Finite Fields, codes and quasi-randomness*
- 10/30 Talal Al-Hawary, PhD Cand.  
The University of Montana  
*To Be Announced*
- 11/13 ACT Speaker  
*To Be Announced*

For further information, please check our website at [www.umt.edu/math](http://www.umt.edu/math)

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