Department of Mathematical Sciences

A Newsletter for Alumni, Faculty, Staff, and Friends   **Spring 1998**

Math Awareness Week April 27th - May 1st

Mathematics and Imaging is the theme for Mathematics Awareness Week 1998, which will be observed nationwide April 27 - May 1. The UM Department of Mathematical Sciences uses this week to recognize our outstanding undergraduate and graduate students with scholarships and prizes and to hold our annual potluck picnic and softball game. We also have a colloquium talk related to the current year's theme and other special activities.

Mathematics Awareness Week (MAW) is co-ordinated by the Joint Policy Board for Mathematics on behalf of three national mathematical organizations--the American Mathematical Society, the Mathematical Association of America, and the Society for Industrial and Applied Mathematics. *Mathematics and Imaging* was selected to highlight the many significant contributions mathematics makes to areas important to our lives. Mathematics is an essential element of imaging in fields as diverse as medicine, computer sciences, and space exploration.

The 1998 Mathematics Awareness Week color poster depicts the role mathematics plays in representing images digitally for storage, transmission, and analysis. It shows a photographic image (see picture) which is decomposed using modern, wavelet-based techniques into three separate images that preserve different features of the original in an extremely efficient manner.

Extensive information about Mathematics Awareness Week—including the theme poster, other visuals, and an annotated essay with links to many other related sites— can be found on the web at *http://forum. swarthmore.edu/maw.*

UM Math Awareness Week Activities

For more information, call the Math Department office at 406/243-5311, email *karenb@selway.umt.edu* or visit our website at *http://grizzly.umt.edu/math/.*

Monday-Friday, April 27-May 1, in front of the Mathematics Building: Artwork. On display all week will be a mathematical sculpture prepared by the members of the Pi Mu Epsilon/ MAA Student Chapter.

Wednesday, April 29, **3:30-5:00 P.M., Dell Brown Room in Turner Hall**: Mathematics Awards Ceremony. Join us for refreshments and the formal presentation of a number of scholarships and awards for our undergraduate and graduate students.

Scholarships include the Joseph Hashisaki Memorial Scholarship and the Mac Johnson Family Scholarships. Awards include the N.J. Lennes Awards for the top performers on a competitive examination, the John A. Peterson Mathematics Education Award, given to a graduating senior in mathematics education, the Graduate Student Distinguished Teaching Awards given to two outstanding Teaching Assistants, and the Undergraduate Teaching Scholar and Undergraduate Tutorial Scholar Awards. In addition, we induct new members of Pi Mu Epsilon, a national mathematics honor society. We also recognize mathematics students who have won University-wide awards.

Thursday, April 30, 4:10 P.M. Colloquium: Curt Vogel, Montana State University, "The Atmospheric Image Deblurring Problem." Professor Vogel will talk about a new software-based approach called Phase Diversity to correct distortions in earth-based telescope images caused by atmospheric temperature variations. This is an alternative to the Adaptive Optics approach which uses deformable mirrors. The talk will touch on topics from physics, mathematics, and computer science. It should be a fascinating talk! (Room to be announced.)

Friday, May 1, 5:00 P.M., Bonner Park: Annual Math Department Spring Potluck and Faculty-Student Softball Game. We're looking forward to good food, good company, and good music. Join us!
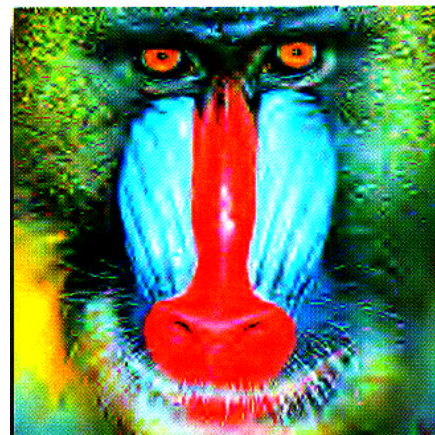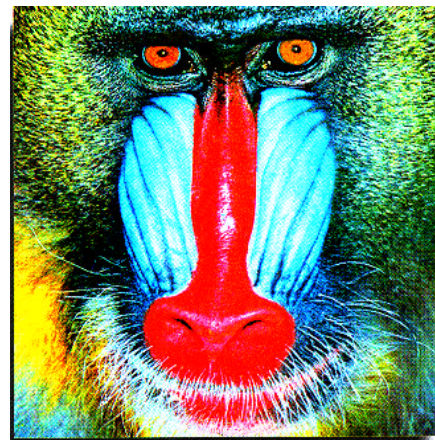
Top: Original Image
Bottom: Wavelet 300:1 compression
courtesy of The Joint Policy Board for Mathematics and Ronald Coifman and Francois Meyer from Yale University

Notes from the Chair's Desk

By Montana standards, winter forgot to come to Missoula this year; it was very mild. We are now busy preparing activities for Math Awareness Week, during which time the achievements of students who study mathematics are recognized and awards are made. Most of these awards are possible through the generosity of our donors. Our donors have been very generous during 1996-97 and we are very pleased with the gifts and grants that have come to the Department. Do read the article in this Newsletter telling you about the awards that are planned for this year.

Discussions at our fall departmental retreat centered on departmental fundraising needs. Many needs were identified and lots of suggestions were made that involved support of undergraduate and graduate students. An informal survey of students showed that family responsibilities and economics were a deterrent to many of our students in their study of mathematics. Many students are holding one of more jobs in order to attend school.

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*

I told you last Spring about our fund raising efforts to establish an endowment account for our new program, **The Undergraduate Mathematics Scholars Program**. The aims of this program are to get and keep students actively involved in their studies, to make them a crucial part of the learning environment, and to increase their interest, excitement and confidence about studying mathematics. The program began this year on a modest level with one Undergraduate Teaching Scholar in the spring semester and an Undergraduate Tutorial Scholar in each of the fall and spring semesters. The exciting feature about this program is that each participant is tied to a particular course and works in partnership with a faculty member who serves as his or her mentor. A MIRACLE HAS OCCURRED and I'm absolutely elated! Through the generosity of John and Charles Bryan, our endowment goal for this program has been met and much, much more. This program now falls under the umbrella of the **George and Dorothy Bryan Endowment** that is an umbrella endowment for programs and activities in the department which enhance the mathematical education of students. This endowment was established with a gift of $500,000 from John and Charles Bryan in honor of their parents, George and Dorothy Bryan. $200,000 of this gift was made a part of the endowment for the Undergraduate Mathematics Scholars Program. An additional $25,000 was given to fund activities for next year while the endowment accrued interest. A special feature article appeared in the fall newsletter about Charles, who was once chair of this department.

The remaining sixty-percent of the funds made available to the department from this endowment will be paid to students in the form of wages, scholarships, and travel expenses in connection with programs and activities previously approved by the faculty. Such programs and activities might include increases in the number of, or award amount to, selected Undergraduate Mathematics Scholars, programs for the Pi Mu Epsilon/MAA Math Club, summer research scholars, special under-graduate teaching assistants, and certain other graduate program enhancements. This is a beautiful start on making the Department of Mathematical Sciences an exciting place to be.

The project of giving the Mathematics Building a new face will continue this summer with work on the classrooms. We are hoping to have enough funds in the Barbara Reiman Fund to complete the redecorating of the Undergraduate Study Room next year. This room is used more than any other room in the building.

Remember that you are always welcome to visit with us and see how we are doing. Don't forget that we want to hear from you and keep open lines of communication with you. Send us your ideas about things you would like to know about the Department and about 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.

Gloria C. Hewitt

To contact the Department:

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Missoula, MT 59812
Phone: 406/243-5311
Webpage: *http://www.umt.edu/math*

Please send mailing list updates and/or address changes to Michelle Johnsen, Secretary, at the above address or e-mail

Faculty Outreach Activities

by David Patterson

Rick Billstein, **Jim Hirstein** and **George McRae** are serving on the Joint Committee on K-16 Mathematics Standards that operates out of the Commissioner of Higher Education's office. The purpose is to consider mathematics standards from kindergarten through university and see how they fit together.

Three textbooks ("Middle Grades Math Thematics, Books 1, 2, and 3") resulting from **Rick Billstein's** $4 million NSF-funded Six Though Eight Mathematics (STEM) grant will become commercially available in April and will be presented to the public at the annual National Council of Teachers of Mathematics (NCTM) meeting in Washington DC. This is a new middle school mathematics curriculum developed at UM over the last 5 years that is being published by McDougal Littell/Houghton Mifflin Publishing Company. Billstein will also direct the UM portion of a $6 million NSF Show-Me grant awarded recently to a consortium of six universities. The purpose of the five-year grant is to promote national awareness of the NSF-funded middle school curriculum projects.

Don Loftsgaarden has just finished serving as Vice-chair of the Survey Committee of the Conference Board of Mathematical Sciences. This committee conducts an extensive survey of Undergraduate Mathematics and Statistics departments at four-year colleges and universities and Mathematics Programs at two-year colleges every 5 years. Don co-authored the latest such study, "Statistical Abstract of Undergraduate Programs in the Mathematical Sciences in the United States: Fall 1995 CBMS Survey," published by the Mathematical Association of America. He also serves on the DATA Committee, a joint committee of the American Mathematical Society, the American Statistical Association, the Institute of Mathematical Statistics, and the Mathematical Association of America.

Rick Billstein

Don Loftsgaarden

Jenny McNulty

Bob McKelvey

Jenny McNulty and **Mark Kayll** recently received a 3-year National Science Foundation grant to support the Big Sky Conference on Discrete Mathematics. Jenny and Mark started this conference, held annually in Missoula, several years ago. The grant will provide travel support, especially for students, and funding for invited speakers. The grant is a joint venture with colleagues Benjamin Keller, Computer Science, UM-Montana Tech, and Erin Spicer and Evan Wantland, Department of Environmental Sciences, UM-Western Montana College.

Kayll and **McNulty** also each received a travel grant from the American Mathematical Society to attend the 1998 International Congress of Mathematicians (ICM) in Berlin, Germany this summer. The ICM is a quadrennial event in which mathematicians from around the world gather to discuss recent developments in mathematics. The Fields Medals (the mathematics equivalent of the Nobel Prize) will be awarded at the opening ceremony.

Professor Emeritus **Robert McKelvey** received a grant from the NSF Undergraduate Enhancement Program for "The Art and Science of Model Building: A Workshop for College Mathematics Teachers." It will run for two weeks in summer 1998 with a follow-up week in summer 1999. It will focus on the mathematical modeling of environ-mental and natural resource conflicts. Other math department faculty participating are Bill Derrick, Jim Hirstein, Jenny McNulty, and David Patterson. McKelvey conducted similar workshops in 1988 and 1991.

David Patterson and John Duffield, Economics, recently received a grant from the National Park Service to study the economic impacts of increased entrance fees at national parks as part of an evaluation of the Park Service's Fee Demonstration Program.

New Course Offering: Contemporary Mathematics

by Jenny McNulty

This fall, the Department of Mathematical Sciences began offering a new course entitled *Contemporary Mathematics.* The course is intended for students fulfilling the General Education requirement which consists of passing one math class above Intermediate Algebra. As the name implies, the course is intended to be an introduction to contemporary mathematics, but what does this mean? Just as learning to read is a necessary tool for the understanding of the great works of Shakespeare, Frost, Sartre, or Solzhenitsyn, so too the rudiments of mathematics are necessary for the comprehension of the applications mathematics has in our society. Often one's mathematical education culminates with the mastery of the fundamentals and one does not have the opportunity to study the uses of these ideas. Consequently, many people view mathematics as a stagnant non dynamic discipline -- but new mathematical ideas and applications are discovered everyday! One goal of the course is to illustrate several ways in which mathematics is used in the "real world" and to examine how mathematics is constantly evolving in order to solve modern problems. With the emergence of the information super highway, massive amounts of information are readily available. Numerical data is presented daily by people such as advertisers, politicians, newspaper reporters, poll-takers, recruiters, and lobbyists. It has become increasingly important to be able to critically analyze this information. Consequently, a second goal of the course is to develop skills to think and reason mathematically in order to function in the modern world. Last but not least, a goal of the course is to have fun and explore the beauty of mathematics.

I taught one of the three pilot sessions this fall and would like to share some of my experiences. I chose to devote the semester to four topics: (I) Symmetry and Tiling (II) Management Science (III) Statistics and Probability and (IV) Fair Division and Apportionment. The first day of class I asked students to describe their feelings about mathematics - *terrifying* and *boring* were the top answers. In addition, many students volunteered that they have had very negative experiences with mathematics. In order to engage the students in the subject matter and to accomplish the goals of the course I used many alternatives to the traditional lecture method. For example, one day I brought different shaped regular tiles to the classroom and had students investigate the properties of semi-regular tilings; another day I brought in a cake and had the class experiment with the fair-division procedure we studied. Students were also shown the practical side of mathematics. For example, they were asked to find uses of statistics in the news and were given a map of a neighborhood and asked to design an optimal method for laying cable to each of the houses. Overall, most students grew to appreciate and understand the role of mathematics in the contemporary world!

The problems below exemplify the flavor of the course. Answers appear on page 8.

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(1) Find all rotations, reflections, and proper glide reflections of the pattern below; in your analysis be sure to identify mirrors, location of glide reflections, and points of rotation on each figure.
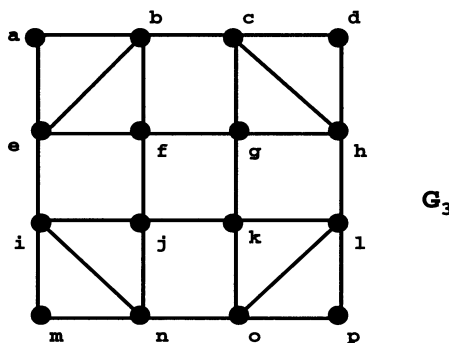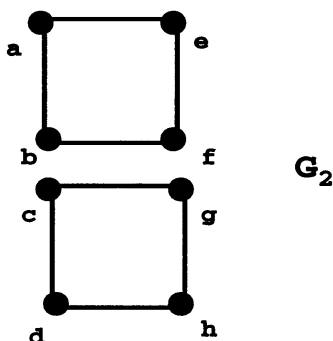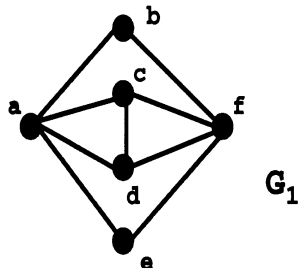
(2) Which of the graphs below have an Euler circuit? (That is which of the graphs have a circuit which uses every edge exactly once.)

The Way It Was

by Gloria C. Hewitt

Last Spring I received a phone call from an attorney in Billings, MT who had graduated with a mathematics major from this university in 1937. He wanted to know who were the mathematics professors in the department other than N. J. Lennes in 1937. Professor N. J. Lennes was chair of this department from 1913 to 1944. I went to the library to find out. I started with 1931 when the department had two faculty members other than N. J. Lennes: Archibald Merrill and Eugene Carey. There were no additions until Fall, 1937 when Harold Chatland joined the faculty and Emma Lommasson came to work as Lennes' assistant at a salary of $150 after four years of high school teaching. The faculty composition did not change again until 1942.

In 1978 Emma Lommasson spoke to the department about mathematicians who were at this university 50 years prior. On that day she walked up the same stairs in the Mathematics Building that took her, as a freshman in the late 1920's, to her first mathematics class taught by N. J. Lennes. Dr. Lennes was a prolific writer. When Emma returned to work for him, he was writing a first year high school algebra book and her first project was to type the manuscript for the printer. When he asked her what she thought of the text as a high school text, she told him that students would find his language a bit difficult to understand. He told her "Go through the book and rewrite the descriptions in simple English"; she did. Her work consisted of typing manuscripts for the printer, proofreading copy, preparing teachers' keys and answer books for each of his texts; he wrote nearly 100. She worked every exercise and problem in his texts. After each text was published and generally accepted, Dr. Lennes would begin a new one and start revisions of earlier ones. During her first two years as Dr. Lennes' assistant, she took a mathematics class every quarter and completed a master's degree in 1939. She acted as his teaching assistant as well and taught one of his classes each quarter, teaching all three of his classes one quarter.

After Dr. Lennes retired in 1944, Dr. Merrill became department chair and during the war years from 1942 to 1945 was director of the war programs on campus. Emma was his assistant and taught mathematics classes, managed the office and prepared the schedule of classes for the Army Air Force College Training Detachment Program. These were busy years and it is interesting to look at the early university enrollment figures: '39 - 1995, '41 - 1488, '42 - 1127, '43 - 674, '44 - 985, and '45 - 1091. After the war ended in 1945 and the programs were terminated, Emma became veterans advisor, handling the paper work for over 2000 veterans who were returning. In 1946, enrollment increased by 2160 students to 3251; she became the assistant registrar and continued to serve as the veterans advisor. She served as acting registrar during the academic year 1972-73 and retired in 1978 as assistant registrar. From that time on, she has continued to volunteer as an advisor to students.

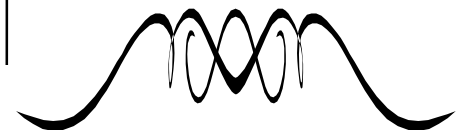Look for more about Dr. N. J. Lennes in the next issue.

Emma Lommasson in front of the Math

πμε/MAA Math Club Corner
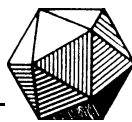

Jennifer Berg, Travis Togo, Kendra Eyer

The Math Club is proud to feature three of its members who are the first recipients of the Department of Mathematical Sciences Undergraduate Tutorial Scholar and Teaching Scholar Awards.

Autumn Semester Kendra Eyer, a Senior, was the Undergraduate Tutorial Scholar for Math 152, *Calculus I* and worked with Professors George Votruba and Keith Yale. Kendra was available to the students several hours a week in order to assist them with any questions they had, deepen their understanding of the material, and assist them with their presentation of homework problems. When asked how she benefited from the experience, Kendra responded, "Upon reviewing the material I began to see connections between what I had learned in Calc I and what I was currently learning in my upper-division math courses. I enjoyed working with the students and helping them to be more comfortable with mathematical processes. Through explaining the concepts of Calculus to them I learned to become clearer in my reasoning in my own courses."

This Spring Semester Jennifer Berg, a Junior, is an Undergraduate Tutorial Scholar for the new Math 107 course, *Contemporary Mathematics*. She is working with Professor Libby Krussel in classroom activities and conducts help and review sessions. Jennifer remarks that, "This experience has increased my clarity when discussing mathematics, has introduced me to some new mathematical concepts, and has shown me both the large amount of work that goes into a class such as Math 107 and the great satisfaction a person has when they help another person understand new ideas."

Travis Togo, a Senior, is the first Undergraduate Teaching Scholar in the Department of Mathematical Sciences. He works with Professor Greg St. George in Math 121, *Precalculus*. Travis lectures between one and three days per week and conducts optional problem sessions on Thursdays. When asked how this experience is benefiting his undergraduate studies, he says, "Now I know what my teacher was trying to tell me when I took Trig and College Algebra. It has prepared me for the teaching duties I will have as a grad student. The experience has solidified my knowledge of elementary algebra and functions."

The Pi Mu Epsilon/MAA Math Club continues to be very active this semester. We meet weekly [Tuesday at 3:10 p.m. in DHC 118] and have a variety of informal talks by faculty, guests, and students. We are also busy planning for Math Awareness Week in April. New members will be inducted into Pi Mu Epsilon [Montana Alpha Chapter] during the awards ceremony on Wednesday, April 29. We also have a big surprise planned for the front of the Mathematics Building during Math Awareness Week, so check it out.

πμε/MAA Math Club Members:

Jenn Berg, Pres.	Allen Hild
Kendra Eyer, V.P.	Kelly Hill
Will Seward, Sec.	Dan Lochridge
Travis Togo, Tres.	Heather Murja
Tony Navarro	Todd Oberg
Angie Concepcion-Wilmott	

Faculty Advisors:

Mary Jean Brod	Keith Yale

1997 Graduate Degree Recipients

Name	Degree	Date	Thesis/Professional Paper/Project Title	Advisor
Lynne Loerzel	M.A.	Spring 1997	*Decomposition in Noetherian Rings*	Manis
William Long	Ph.D.	Spring 1997	*Asymptotic Analysis of the Dissolution of a Spherical Bubble in the Case of a Fast Reaction*	Kalachev
Sangadji	Ph.D.	Spring 1997	*Compact Toeplitz Operators on Fock Spaces*	Stroethoff
Matthew Seeley	M.A.	Spring 1997	*The Long-Term Effects of Habitat Clustering on Spotted Owl Populations*	Derrick
Renae Hinman	M.A.T.	Summer 1997	*A Problem Solving Game for Algebra Students*	Hirstein
Talal Al-Hawary	Ph.D.	Fall 1997	*Toward an Axiomatic Characterization of a Category of Matroids*	McRae/ McNulty
David Goldsmith	M.A.	Fall 1997	*Lattice-Boltzmann Simulation of Fluid Flow*	Derrick

Mathematics Competitions

by Jim Hirstein

Once again, I was honored to serve as state coordinator for the American Mathematics Competitions. The junior high school exam was taken by 1867 students in 35 schools in November. Two students tied for the highest score in the state: Brian Vankoten, a 7th grader, and Russell Wardinski, an 8th grader.

Both are students at C.R. Anderson Middle School in Helena. Brian and Russell scored in the top 0.3% of over 200,000 students who took the exam nationally.

The AHSME, American High School Mathematics Examination, was taken in February by 2140 students in 46 Montana high schools. Joshua Engle, a junior at Billings West High School, was the top scorer in the state. Joshua and eleven other

Spring 1998 Colloquium Calendar

Feb. 12	Sidney Graham National Sci. Foundation	April 9	Barbara Edwards Oregon State University
Feb. 19	Alexander Belov The University of Montana	April 16	Joseph E. Bonin George Washington Univ.
Feb. 26	Hayley Hesseln The University of Montana	April 23	Michael Saks Rutgers University
March 5	Jeong Han Kim Microsoft Research	April 30	Curt Vogel Montana State University
March 12	Robert Mifflin Washington State Univ.	May 7	Blake Peterson Brigham Young University
March 26	Steven Liedahl The University of Montana		

Schedule subject to change

For further information, please check our website at *http://www.umt.edu/math*

Montana students will be invited to take the AIME, American Invitational Mathematics Examination, as the next step in the selection of the U.S. Mathematics Olympiad Team.

The AHSME also reports a team score for each participating school. This year's winners in the team competition are:

1st: Billings West High School
2nd: Billings Senior High School
3rd: Missoula Sentinel High School.

The Department of Mathematical Sciences increasingly relies on donations to support its activities. With tuition increases continuing to far outpace inflation, scholarships are vitally important. Scholarship and other existing funds that help to meet some of the educational needs of the department and our students are:

Joseph Hashisaki Fund - an endowed scholarship for one or two upperclass math majors based on academic achievement.
Mac Johnson Family Fund - endowed scholarships for undergraduate students showing promise in mathematics.
George and Dorothy Bryan Endowment - an endowment in support of undergraduate and graduate students.
Barbara Reiman Fund - a non-endowed fund for the renovation of the undergraduate study room.
Colloquium Fund - an endowment to provide funds to bring in visiting speakers.
Please consider a gift to one of these funds or to the Math Department's Excellence Fund to be used where the need is greatest.

The University of Montana, Department of Mathematical Sciences
c/o UM Foundation, P.O. Box 7159
Missoula, MT 59812

I/We intend to give $_____ to the Department of Mathematical Sciences Excellence Fund
I/We intend to give $_____ to the Department of Mathematical Sciences for _____
I/We intend to give $_____ to the University's overall Excellence Fund

Matching gift: _____ My employer will match my gift. Matching gift form enclosed.

Credit Card: ☐ Visa ☐ MasterCard ☐ American Express

Signature _____

Account Number _____ Expiration Date: _____

Please return this form with your check, payable to The University of Montana Foundation
For information on other ways to give, contact Vickie Mikelsons, Development Officer for the College of Arts and Sciences, 1-800-443-2593

M156

Answers from page 4:

1. There are none
2. Only G_3

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