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Fermat and Mersenne Numbers

Pierre de Fermat (1601-1665) was one of the founders of analytic geometry and calculus. Today, however, he is remembered principally for his work in number theory. One problem that occupied Fermat was that of finding a formula involving the positive integer n which for n = 1,2,3,... would yield *only* prime numbers. In this connection he investigated what have become known as the Fermat numbers

$$F_n = 2^{2^n} + 1, \ n = 1,2,3,\ldots,$$

and conjectured that each F_n is prime. This is easily verified in the cases of $F_1 = 5$, $F_2 = 17$, $F_3 = 257$, and $F_4 = 65,537$.

In 1732 Euler factored F_5, $F_5 = 641 \times 6,700,417$, thus disproving Fermat's conjecture. The last prime F_n so far found is F_4, and some mathematicians believe that there are no more primes in the sequence.

The Mersenne numbers $M_p = 2^p - 1$, where p is prime, were studied by Father M. Mersenne (1588-1648) who conjectured that the only p's for which M_p is prime are

p = 2, 3, 5, 7, 13, 17, 19, 31, 67, 127, 257.

It would be interesting to know how Mersenne arrived at this assertion. The first counter example was found in the 1880's when M_{61} was proved to be prime and to date a total of 30 "Mersenne primes" have been discovered.

Even with the advent of supercomputers the calculations in specific cases are extremely time-consuming. In 1984, a 32-hour search on a Cray computer was needed to factor M_{251} as a product of primes:

$$2^{251} - 1 = 503 \times 54, 217$$
$$\times 178,230,287,214,$$
$$063,289,511$$
$$\times 61,676,882,198,$$
$$695,257,501,367$$
$$\times 12,070,396,178,$$
$$249,893,039,969,681.$$

Which Mersenne numbers are prime? Which Fermat numbers are prime? These questions are still open and are clearly very difficult.

Solution to the Weird Dice Problem

The faces of a standard cubical die are labeled by the integers one through six. If two such dice are rolled, it is easy to calculate the probability of rolling any number from two through twelve. In last year's *Newsletter* we posed the following problem: Can a different, "weird," labeling be found for the faces of the two dice so that with this new labeling the probability of rolling each of the numbers two through twelve remains the same as it is with the standard dice? Readers were requested to send in solutions, and the problem was solved by Greg Wilson, a 1981 graduate. No one else offered a solution. Congratulations, Greg! The unique solution is to label one die with the integers 1, 2, 2, 3, 3, 4 and the other die with the integers 1, 3, 4, 5, 6, 8. (These are called *Sicherman dice*.) Interested readers can find a derivation of the solution in "Mathematical Games" by Martin Gardner, *Scientific American* 238 (1978): 19-32 or in *Contemporary Abstract Algebra* by Joseph Gallian, Heath (1986): 219-220.

Applied Mathematics for High Schools

The Mathematical Association of America and Oklahoma State University are cooperating on a project to develop and disseminate applied mathematics learning modules to secondary school teachers for classroom use.

These modules will be self-contained instructional packages consisting of three video cassettes, a student handbook, computer software, and a teacher's manual. The aim is to involve students in problem-solving as it occurs in industry.

Watch for an announcement on the availability of these modules early in 1987. They will be free of charge on an order basis to each secondary school in the United States.

An Interesting Proof of a Theorem of Pascal—
S.J. Drouilhet, II

There is a standard proof of Pascal's Theorem on hexagons inscribed in conic curves which provides an intriguing introduction to algebraic geometry. Recall that the theorem states: Let C be a conic and R,S,T,U,V,W be six distinct points on C. Form a hexagon by joining R to S to T to U to V to W to R by line segments. If X,Y,Z are the intersection points of pairs of opposite sides of the hexagon thus inscribed in the conic, then X,Y,Z are collinear.

To prove the theorem, we will first review some concepts and facts from elementary algebraic geometry. Let A be the set of all ordered pairs (x,y) of complex numbers, "suitably compactified" (a concept of great technical importance which the reader can ignore). A polynomial equation $f(x,y) = 0$ defines a curve in A whose degree = the degree of $f(x,y)$. Curves of degrees 1,2,3 are called lines, conics, and cubics respectively. It can be shown that 2 distinct lines intersect in a point, and that 2 general cubics intersect in 9 points in A. It can also be shown that if E,F,G are cubics and G passes through eight of the nine intersection points of E and F, then it must pass through the ninth as well. Note that the union of 3 lines can be expressed as the zero set of a product of 3 linear equations and is thus a cubic; and similarly, the union of a conic and a line is a cubic.

Let $L_1 = \overline{RS}$ (the line through R and S), $L_2 = \overline{ST}$, $L_3 = \overline{TU}$, $L_4 = \overline{UV}$, $L_5 = \overline{VW}$, $L_6 = \overline{WR}$. Then the intersection points of pairs of opposite sides of the hexagon are $X = L_1 \cap L_4$, $Y = L_2 \cap L_5$, $Z = L_3 \cap L_6$. Let CuI be the cubic $CuI = L_1 \cup L_3 \cup L_5$ and CuII be the cubic $CuII = L_2 \cup L_4 \cup L_6$. Let CuIII be the cubic $CuIII = C \cup \overline{XY}$.

By considering the intersection points of L_i and L_j for all i,j we see that $CuI \cap CuII = \{S,X,R,T,U,Z,Y,V,W\}$. Of these nine points, eight are clearly on CuIII: for R,S,T,U,V,W are on the conic C, and X,Y are on $\overline{XY}$. Thus CuIII must pass through the ninth intersection point, Z, of CuI and CuII as well. Hence $Z \in CuIII = C \cup \overline{XY}$. Clearly $Z \notin C$. Thus $Z \in \overline{XY}$, so X,Y,Z are collinear.

The reader is invited to draw pictures in R^2 to illustrate Pascal's Theorem. (Note that the sides of the hexagon are allowed to cross.) What happens if two opposite sides are parallel? It turns out that they have an ideal intersection point in the "suitable compactification" mentioned above, but in this situation the theorem cannot be illustrated graphically.

(Dr. Drouilhet received his B.A., M.A. and Ph.D. degrees from Rice University.)

Department News

The Mathematics Department's Warren Thomsen and his wife Dorothy, a faculty member in the New Center, have announced that they will retire at the end of the academic year. Dr. Thomsen received his B.A. degree at the University of Northern Iowa and M.S. and Ph.D. degrees from the State University of Iowa. He came to MSU in 1965 and chaired the department from 1966 to 1977. Previously he was head of the Mankato State University Mathematics Department from 1957 to 1965.

Warren and Dorothy Thomsen are well-known for their commitment to helping others. While they have not completed their retirement plans, it is almost certain that once again they will be involved in a service project such as the Peace Corps.

* * *

Six Moorhead State University students passed the first in a series of exams administered by the Society of Actuaries and another passed the third.

The exams are part of a 10-section series leading to admission to the Society of Actuaries.

Passing the first test were:

*Timothy Berg, an MSU senior from Bagley, the son of Mr. and Mrs. Lloyd Berg and a 1981 graduate of Bagley High School.

*Theresa (Fedor) Riesen, a 1985 MSU graduate from Holdingford who is currently doing graduate work at the University of Nebraska-Lincoln. She is the daughter of Mr. and Mrs. Andrew Fedor and a 1981 graduate of Holdingford High School.

*Peter Ringdahl, a 1985 MSU graduate from McVille, ND, the son of Mr. and Mrs. Grant Ringdahl and a 1980 graduate of McVille High School.

*Kevin Russell, a 1985 MSU graduate from Albuquerque who is pursuing a master's degree in statistics at North Dakota State University.

*Danny Wendt, a senior from Detroit Lakes, the son of Mr. and Mrs. Herbert Wendt and a 1982 graduate of Frazee High School.

*Daniel Willoughby, who is a 1985 MSU graduate from Atwater. He is the son of Mr. and Ms. Richard Willoughby and a 1981 graduate of Motley High School.

Passing the third test in the series:

*Mark Rothmann, a 1985 MSU grad who is enrolled in the University of Iowa's graduate program. He is the son of Dr. and Mrs. Derald Rothmann and a 1981 graduate of Moorhead High School.

These students prepared for the exams by enrolling in actuarial courses taught by Dr. Bette Midgarden.

* * *

The paper, "Unique Product Elements and Right Orders" by F. D. Pedersen of Southern Illinois University and Walter S. Sizer, from the MSU math department, appears as a chapter in a recently published book, *Ordered Algebraic Structures*, edited by Wayne Powell and Constantine Tsinakis.

* * *

Bette Midgarden presented an invited address titled "Using Number Theory to Illustrate Problem Solving Strategies" to a meeting of the North Dakota Council of Teachers of Mathematics.

* * *

A paper by Don Mattson titled "Filter Characterizations of Almost P-embedded Subspaces" was published in *The Journal of the Indian Mathematical Society*.

* * *

Marvel Froemming was invited to give a talk at the annual meeting of the National Council of Teachers of Mathematics in Washington, D.C., this spring. The title of her presentation was "Developing Competent, Confident, Elementary Mathematics Teachers."

* * *

Each year the department awards memberships in professional societies to outstanding senior mathematics students. These awards are financed by contributions from department members.

Students receiving the awards this year were:

*Rebecca Lewin, a senior from Richville, membership in the National Council of Teachers of Mathematics.

*Danny Wendt, a senior from Detroit Lakes, membership in the American Statistical Association.

* * *

"Continued Roots," a paper by Walter S. Sizer, appeared in the February 1986 issue of *Mathematics Magazine*.

* * *

Each year the Mathematical Association of America sponsors the William Lowell Putnam Mathematical Competition. A competition that attracts the best mathematical talent in the United States and Canada, this year's contest had 2,079 individual students and 264 three-member teams from 348 colleges and universities. We are proud to announce that Moorhead State University sophomore Daniel F. Schroeder (Pelican Rapids) scored in the top 19% of individuals taking the exam. The MSU team was composed of Schroeder, John P. Sheridan (Junior, Crookson), and Thomas J. Stone (Sophomore, Canby). They placed 99th out of the 264 teams. These students were coached by S. J. Drouilhet, II, Don A. Mattson, and Walter S. Sizer.

* * *

Rebecca Lewin, a senior from Richville, has been informed by the Board of Directors of the Honor Society of Phi Kappa Phi that she has been awarded a $6,000 fellowship for graduate study during the academic year 1986-87. Becky plans to attend the University of Iowa to work towards a Ph.D in mathematics.

* * *

Two teams representing Moorhead State University in the second annual National Mathematical Competition in Modeling received Honorable Mention for the papers they submitted on Facilities Location. One team consisted of Gary Seiler (Raleigh, ND), Paul Heng (Barnesville, MN), and Thomas Stone (Canby, MN) while the members of the other team were Carla Thorson (Fargo, ND), Pat Larson (Moorhead, MN), and Danny Wendt (Detroit Lakes, MN). Stone is a sophomore; all other team members are seniors. The competition, supported by the U.S. Department of Education Fund for the Improvement of Post-Secondary Education, was held during the February 7-9 weekend. Team advisor was Ronald M. Jeppson of the MSU Mathematics Department.

* * *

Alumni News

David Gosslee (B.S. 1947). After graduating from MSU David went on to complete an M.S. in 1950 (Iowa State University) and a Ph.D. in 1956 (North Carolina State University), both degrees being in statistics. He was on the NDSU faculty from 1950-1958 and from 1958-1961 he was an Associate Professor at the University of Connecticut. Since 1961 he has been with the Oak Ridge National Laboratory (ORNL) as head of the statistics group in the Mathematical Sciences Section. His group of twelve does research in statistics and consults with other divisions of the ORNL.

Gary Krenz (B.A. 1978). Gary (a/k/a RADAR) received his Ph.D. in applied math from Iowa State University on December 22, 1984 and currently has a tenure track position in Marquette University's math department. The department will host the 15th Annual Midwest O.D.E. Conference this coming fall. As of May 1985 Marquette has a brand new doctoral program in mathematics. Gary encourages persons interested in graduate work in biomath modeling or algebraic semigroups to consider Marquette.

Sharon Erlien Peterson (B.S. 1973). Sharon and husband Jim have two children: Steven, 5, and Kristin, 2.

Sharon teaches calculus, advanced math, geometry and computer programming at Rice Lake high school in Wisconsin. She is currently working on her master's degree at the University of Wisconsin—Eau Claire.

Brent Rognlie (B.A. 1985). A graduate student in statistics at Kansas State University, Brent also is a graduate assistant and teaches freshman courses in both math and statistics. He and his wife, Sue, are expecting their first child in July.

Joe Riesen (B.A. 1984). Joe married Theresa Fedor in July 1985. This is Joe's second year as a Graduate Teaching Assistant at the University of Nebraska-Lincoln.

Theresa (Fedor) Riesen (B.A. 1985). Theresa married Joe Riesen in July 1985. Theresa is a graduate student at the University of Nebraska-Lincoln. Joe and Theresa write that they are very busy learning new mathematics. "We barely have time to turn around it seems. We enjoy school, though," reports Theresa.

Jon C. Stenerson (B.A. 1984). Jon and his wife are both graduate students at New Mexico State University, where he is in the math department while his wife is in the psychology department.

Jerry Reck (B.S. 1978). Jerry teaches math to grades 8-12 in the Motley Public Schools, where he is also the head boys' basketball coach and assistant football coach. He recently completed a minor in computer science at MSU during summer sessions and is presently working on some free lance programming for area businesses.

Jane (Motzko) Reck (B.S. 1977). Jane teaches SLD K-4 at the Staples Public School, was the lead resource teacher for one year, and is currently serving as Case Study Coordinator. She recently completed her E/BD certification and is involved with the development of an E/BD program at Staples. Jerry and Jane are still living in rural Motley and have two children, Jason, 3, and Tessa, 1.

Brian Hanson (B.A.1978). Brian has a double major in math and geography and presently has a post-doctoral research fellowship at the National Center for Atmospheric Research in Boulder,

Colorado. He uses numerical models of ice-sheet dynamics and thermodynamics to study the coupling between ice sheets and climate.

Scott Peterson (B.A. 1985). A double major in math and computer science, Scott is at Purdue University in Indiana as a Graduate Teaching Assistant in the Department of Computer Science.

John Lindstrom (B.A. 1973). John lives in Fargo with his wife, Marie Fiandaca, a 1976 computer science graduate of MSU. He is a Data Analyst II at NDSU in the Administrative Services department of the Computer Center and is group leader of maintenance for the administrative systems of the HECN (N.D. Higher Education Computer Network).

Claudia (Brainard) R. Wiebold (B.A. 1981). Employed by Minnesota Mutual Insurance Company of St. Paul as a Project Leader in Information Systems, Claudia has responsibilities in design, analysis and programming as well as supervising three programmers. She has obtained Fellowship in the Life Management Institute. Claudia and her husband, Don, who is a 1980 MSU graduate working as a programmer at Sperry Corporation, are expecting their first child around May 1st.

Spencer Hjelle (B.A. 1976). Spencer is with the Minnesota Department of Revenue as a Tax Examiner IV and lives in Virginia, Minnesota.

Jerry Cullen (1971). Employed by Serving Software, Inc., Jerry is Director of Product Development. He lives in Coon Rapids, Minnesota.

Gail Kelm (B.S. 1985). Gail teaches Special Education-EMH in grades K-12 at ISD #60 in Graceville, Minnesota. She loves teaching, but misses math. Gail also was the 7th and 8th grade girls' basketball coach and will be helping with girls' softball this spring.

Sue Haller (B.S. 1984). Sue is a Junior High Math Teacher at Franklin Junior High in Brainerd, and also coaches girls' volleyball, basketball and softball.

Laurel Jackson Johnson (B.S. 1973). Laurel is a part-time instructor at Eastern Wyoming College/Douglas Branch. Her husband Ken is a business instructor there also. They have two daughters, Katherine, 9 years and Kristine, 1.

Kelly Bretz (B.A. 1984). Currently employed with Northwestern National Life Insurance Company in Minneapolis as an Actuarial Assistant, Kelly has successfully completed parts 1 through 4 of the actuarial exams and is studying for her Associateship in the Society of Actuaries.

Sheila (Ruona) Ascheman (B.S. 1976). Sheila teaches mathematics in Mountainburg, Arkansas. She and husband Gary have two children, Landon, 5 and Bethany, 1. Gary is head of the Merchandising Department for West Ark Commodities of Guthrie, Oklahoma. They have a home computer and Sheila is seriously thinking of going back to school for a computer science major.

Loren Volk (B.A. 1985). Loren is a Systems Engineer for Electronic Data Services (E.D.S.) in Pontiac, Michigan. E.D.S. is involved in restructuring all data processing areas for General Motors. Loren and his wife are expecting their first child.

Mary Mikkelson Block (B.A. 1981). Mary was recently promoted to General Manager of the Perkin's Restaurant in Fargo. Her husband, Larry, is working towards a master's degree in English at NDSU. Mary and Larry are expecting their first baby in August.

Kenneth Welken (M.S. 1974). A seventh grade mathematics teacher at the Moorhead Middle School—South Campus, Ken is active in the local mathematical community. Each year he helps sponsor teams in the Tri-College Mathematics contest. For the past three years one of his teams has placed first in the junior high competition. Also, Ken chairs his school's mathematics department. Ken and his wife, Jan, have two sons, Nathan, 8, and Nicholas, 4. The family keeps busy with activities including tennis, bicycling, soccer, running, and swimming.

David W. Jacobson (B.A. 1980). An Associate Reliability Engineer with IBM in Rochester, Minnesota, Dave received an IBM Technical Award for work done on the reliability impacts of various kinds of stress screening. This past year, Dave attended conferences in Pennsylvania and New York and presented a paper titled "Nonparametric Analysis of Covariance" at the IBM Design of Experiments Conference. Dave and wife, Deb, expect their first child this spring.

Duane Van Den Broeke (B.A. 1980). Duane works for Zycad Corporation in Brooklyn Park as an Applications Programmer. Zycad makes a special purpose supercomputer to do simulation of logic designs and Duane works in the development of programs to facilitate communication between user and computer.

Brad Kingsley (B.A. 1984). A mathematics and computer science teacher at the Marietta-Nassau School, Brad keeps busy teaching seventh and eighth grade math, ninth grade algebra, advanced algebra, computer science, and geometry as well as coaching football and boys' basketball.

Nedda Kay (Rach) Zetan (B.S. 1983). Nedda is a junior high math teacher at Healy Junior High in Pierz and is also head girls' track coach, volleyball coach, and basketball coach there. She and her husband, Dan, live in Little Falls.

JoAnne (Groff) Gerdes (B.A. 1979). JoAnne and husband Bradley both work for I.D.S. Financial Services. JoAnne is Manager-New Business and Defined Benefit Annual Administration, a promotion that she received this past year. JoAnne and Brad reside in Excelsior.

Colleen (Beck) Deutsch (B.S. 1973). A resident of Littleton, Colorado, Colleen has been very active since we last heard from her. Presently she is Vice President—Human Affairs for U.S. West Material Resources which is the procurement branch of U.S. West (Northwestern Bell, Mountain Bell, Pacific Bell, and other unregulated subsidiaries). Previously she was Director of Benefit Administration—U.S. West, a subsidiary which managed benefit plans for 70,000 participants. In 1982 Colleen was named "Outstanding Young Career Woman" for Fargo and was first runner up in North Dakota. Also, she was the nominee in the business category for the 1982 Fargo-Moorhead "Woman of the year." Colleen and husband Tad, a 1970 MSU grad, have two children, Matthew, 9, and Megan, 5. Colleen's father, Dan Beck, is a very active worker for the MSU Foundation.

Lester Olson (B.A. 1977). A double major in mathematics and rhetoric/public address, Lester is Assistant Professor in the Department of Communication at the University of Pittsburgh. His doctoral dissertation, "Emblems of American Community: A Study in Rhetorical Iconology," was awarded the Speech Communication Association's national "Dissertation Award for 1985." Last year Lester spoke at two international conferences, one at Oxford to the International Society for the History of Rhetoric and one at Philadelphia to the International Visual Communication Conference.

Dean R. Harris (B.A. 1971). Dean works in Arlington, Virginia, where he is a Senior Computer Scientist for Computer Sciences Corporation. He has been promoted to leader of a task force to design and implement a budget and accounting system for a large government agency.

Beth (Stone) Ranum (B.A. 1985). Beth is employed by Milliman and Robertson of Seattle, Washington, the largest actuarial consulting firm in the country. She works in life insurance and has been "learning all about life contingencies." Beth says she enjoys the balmy weather in Washington and "I certainly don't miss the winter weather."

Kent Battles (B.A. 1985). Kent has enrolled at Mankato State University to pursue a degree in electrical engineering.

Robin Kremer Ladd (B.S. 1982). An 8th grade mathematics teacher/computer specialist for the Berkeley County School District in Charleston, South Carolina, Robin was named Teacher of the Year for 1985-1986.

Kimberly Hasz (B.S. 1985). Kimberly is teaching two levels of 9th grade algebra at Prior Lake Senior High in Prior Lake, Minnesota.

Jerry Zimny (B.S. 1972). In addition to teaching math and physics at Esko Public School in Esko, Minnesota, Jerry is assistant cross-country coach, assistant boys' basketball coach and head boys' track coach. He was selected for an NSF Summer Physics Institute in 1985. Jerry and his wife Barb have four children, Kelli 10, Ryan 8, Zachary 4, and Bridget 2.

Steve Dale (B.A. 1983). Steve is a farmer near Jamestown, North Dakota. He married Tracy Hanson August 24, 1985. She will soon complete her coursework as a registered nurse.

Bill Johnson (B.A. 1983). Bill is with the Navy Astronautics Group as a Satellite Analyst. He has received speaking and achievement awards and says he is having a great time in southern California.

Rosanne McFadden (B.A. 1979). Manager of Tobak & News in St. Paul, Rosanne is presently studying electronic technology at Brown Institute in Minneapolis. Recently she was named to the Dean's list there.

Steve Riewer (B.S. 1984). Steve is a high school math teacher and head baseball coach at Bertha-Hewitt High School in Bertha, Minnesota.

Luanne (Shannon) Swenson (B.A. 1976). Luanne is married to Steven L. Swenson, a 1975 graduate of Moorhead State. She is an electrical engineer for the FMC Corporation in Minneapolis and Steve is Controller at Unity Hospital. They have one son, Eric, age 4.

Ted Saxman (B.A. 1971). Ted married Renee K. Dyshaw on November 23, 1985. He is a Development Programmer in Advanced Systems Programming in the IBM Rochester Lab working on the System/38. Leadership and close attention to product quality led to an SPD President's Award for Ted. The President's Award is given to those who have consistently excelled throughout their IBM careers. Saxman's award is based on his many achievements since joining the company in 1964. He started in Rochester in 1977 and has worked primarily on the System/38. The most recent projects carried out under his leadership were the development of unannounced enhancement for a product and rewrite of the Load/Dump function for the System/38. Load/Dump is a portion of the software on the System/38 that saves and restores data and programs. The rewrite improved the performance of this function.

John Bisek (B.A. 1977). John is a Programmer with the Sperry Corporation in St. Paul. He and his wife Mickie, have two daughters, Carly 3, and Rachel 4 months.

Karen Muckenhirn Priem (B.S. 1980). Karen teaches math and German part time in the Janesville, Minnesota, High School. She now has two children.

Merilee Potucek (B.A. 1982). A bookkeeper/receptionist at Charlson & Marben, P.A., Merilee and husband, Mark, live in Thief River Falls.

Suzann (Dahnke) Olson (B.S. 1985). Suzann teaches Algebra I, Algebra II and 8th grade math at Cook County High School in Grand Marais, Minnesota. She is married and has a six-month-old son.

David Bergstrom (B.A. 1979). Dave is Assistant Vice President and Associate Actuary at Western States Life Insurance Company in Fargo. He completed the last actuarial exam in May of 1985 and is now a Fellow of the Society of Actuaries, the highest credential that an actuary can attain.

Maris Shields (B.A. 1977) Maris returned to school last fall and is pursuing a master's degree in computer science at NDSU. She is presently also a teaching assistant in mathematics there.

Greg Wilson (B.A. 1981). Greg is Office Manager at Wilson Supply Co., a family-owned plumbing and heating wholesale business. He and his wife are expecting their first child in July. Greg was the only reader to send in a solution to the weird dice problem that was posed in last year's Newsletter.

Jon Noah (B.A. 1972). Jon is the owner of NOAH Insurance Agency in Amery, Wisconsin. He and his wife Carolyn have two sons, Mitchell, age 6, and Adam, age 4.

Kevin Russell (B.A. 1985). Kevin is a graduate student majoring in statistics at NDSU and, as a graduate assistant, has been teaching freshman statistics courses there.

Russell Hammond (B.A. 1985). Russell is doing graduate work at the University of Minnesota in the linguistic field.

Mark Rothmann (B.A. 1985). Mark completed the third actuarial exam last spring while still an undergraduate at MSU. He is presently a graduate student at the University of Iowa majoring in statistics. His duties as a graduate assistant include teaching elementary statistics courses.

Miscellanea

A woman just finished painting her house and needs somthing more. At the hardware store the clerk shows her what she wants and says "one is $1." "Fine," says the woman, " I took 500 so here's $3." What had she bought?

There are more than twice as many left-handed architects and mathematicians as one would predict from the general population.

"The perfection of mathematical beauty is such that whatever is most beautiful and regular is also found to be most useful and excellent." —D'Arcy W. Thompson, **On Growth and Form.**

Thanks to those who answered the request for news and to those who write to department members throughout the year. Also, special thanks to Jo Moritz who typed this *Newsletter* and who wrote the Alumni News.

M. Legg, Chair
Mathematics Department