Weird Dice

This spring, Professor Joseph Gallian of the University of Minnesota-Duluth, a visiting lecturer for the Mathematical Association of America, spoke on the MSU campus. One of his talks, “Weird Dice,” was inspired by a problem from Scientific American that some Newsletter readers may find interesting to solve.

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. The problem we pose is this: 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? Note that some numbers may need to be used more than once as labels, that integers larger than six may be used, and that the two weird dice may be labeled differently.

There is a unique solution to the problem. Readers who find the solution should send it to M. Legg. The solution, along with the names of the solvers, will be included in the next Newsletter.

Mathematics Salaries: Increasing Focus, the Newsletter of the Mathematical Association of America, reports in the October 1984 issue that there is good evidence that “Mathematicians are in increasing demand and are doing very well in the real world!” Here are some data compiled by the College Placement Council.

<table>
<thead>
<tr>
<th>Curriculum</th>
<th>Average Offer 1983-1984</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanical Engrg.</td>
<td>$26,280</td>
</tr>
<tr>
<td>Computer Science</td>
<td>$24,552</td>
</tr>
<tr>
<td>MATHEMATICS</td>
<td>$23,400</td>
</tr>
<tr>
<td>Civil Engineering</td>
<td>$22,764</td>
</tr>
<tr>
<td>Accounting</td>
<td>$19,524</td>
</tr>
</tbody>
</table>

Those of us in mathematics should make sure that mathematically talented high school students are informed of these figures and are encouraged to pursue mathematical careers.

New Linear Programming Method Developed

The objective of linear programming is to maximize (or minimize) a linear function subject to the constraints of a system of linear inequalities.

Most readers of this Newsletter are familiar with the simplex method for solving such problems. This algorithm is a relatively recent mathematical invention, being developed by George Danzig in 1947.

Many businesses must solve linear programming problems in order to allocate limited resources in such a manner as to maximize profit. These problems may involve thousands of variables and are solved by programming the simplex method on a large computer. The method is, however, slow; and works only when there are just a few thousand variables to sort through.

Hence for at least twenty-five years mathematicians have been searching for a faster and more powerful solution method. Bell Laboratories at Murray Hill, N.J., recently announced that a new and improved method has been developed by Narendra Karmarkar, a 28-year-old Indian-born mathematician.

This breakthrough in mathematics was accomplished by Karmarkar after just one year’s concentrated work! At each step the new algorithm eliminates whole sets of possible solutions and travels in a very efficient manner towards the optimal solution. Whereas the Danzig method travels from vertex to vertex along an edge of the feasible region, Karmarkar’s method can move through the interior of the region to increase efficiency. This new method should allow computers to handle larger problems in a shorter time than is presently possible.

In this development we see a theoretical result that has an immediate practical application.

How to De-Cantor

If by now you have attained gainful employment, it is almost a certainty that on some evenings, while seated by your fireplace, the conversation turns to the nature of mathematics. One of your friends, knowing that you were a mathematics major, asks “What is mathematics?” This causes a stirring in the memory banks and a conversation which probably goes something like this.

You: “It’s not all cut and dried, true or false.”

Friend: “I thought mathematics was terribly dry and that everything has an answer, and that all the answers have been known since Day One.”

You (in order to gently introduce the friend to the vagaries of mathematics): “Consider this fable. A rich prince decreed that poaching on his land would be punishable by death, either by hanging or decapitation. A culprit was to be allowed a single statement which, if false, caused him to be hanged, but, if true, resulted in beheading. One day, a clever peasant ( schooled in mathematics) was caught poaching and was allowed to make his final statement. The peasant simply said ‘I shall be hanged.’ Now the prince’s word is law so that if the statement is false the
poacher must be hanged which now renders that statement true. If the declaraton is judged true, the poacher is to be beheaded but this, of course, makes it false. Since the prince's law must be obeyed, what should be done? (Legend has it that the peasant died of old age while the argument raged on)."

By now you see that you have engaged your friend's interest and that you can carry the idea further. You point out that all of mathematics can be developed from the notion of a set and that Georg Cantor was one of the first mathematicians to formalize set theory. You tell your friend that the idea of mathematics is simple; just specify a few rules (axioms) and definitions and prove everything from this modest beginning.

Cantor, in his attempt to put mathematics on a sound set— theoretical foundation, produced very useful notions of infinite sets which, after their introduction, were viewed with great suspicion by some prominent mathematicians. Nevertheless, the development of mathematics, based largely on Cantor's set theory, proceeded, and a host of new results were proved.

In 1902, however, the foundations of mathematics were severely shaken by Bertrand Russell's discovery of what is now known as the "Russell Set," the set S of all elements which are not elements of themselves. Then S belongs to S if and only if S does not belong to S follows immediately.

Since the notion of set is fundamental to mathematics and since the above statement is apparently a contradiction of the most basic sort, mathematics itself was thought to be in dire straits. A great flurry of activity followed the discovery of this paradox and —

Glancing over, you see that your friend, warmed by the fire, has fallen asleep.

— Don Mattson

(Dr. Mattson received his B.A. from Wesleyan University and his Ph.D. from the University of Wisconsin.)

Department News

Dr. Bill V. Ritchie, a member of the department since 1968, retired last spring. He received his B.S., M.S., and Ph.D. degrees from Purdue University and was department chairman at the University of Detroit prior to coming to MSU. With Ritchie's retirement the department lost its best "problem solver"—not all mathematicians are problem solvers, but Bill Ritchie is certainly one of the first rank.

He and his wife, Eleanor, continue to make their home in Fargo.

The annual fall meeting of the North Central Section/Mathematical Association of America was held at MSU on October 26 and 27, 1984. Don A. Mattson was general chairman of the event which featured Professor Ivan Niven of the University of Oregon as invited lecturer.

Carl Carlson was one of 40 Minnesota representatives of business and education invited to participate in an organizational meeting for Minnesota Mathematics Mobilization. This statewide organization will seek ways to improve pre-college mathematics education.

This year the department began what will become an annual practice: awarding memberships in professional organizations to outstanding juniors and seniors. These awards are financed by contributions from department members and carry the student's choice of membership in the American Mathematical Society, the Mathematical Association of America, the American Statistical Association, or the National Council of Teachers of Mathematics.

Students receiving the awards this year were:

*Mark Rothmann, a senior from Moorhead.
*Theresa Fedor, a senior from Holdingford.
*Daniel Willoughby, a senior from Atwater.
*Beth Ann Stone, a senior from Grand Marais.
*Russel Hammond, a senior from Eagle Bend.

Five MSU students passed the first exam in the series administered by the Society of Actuaries, and two students passed the second exam. There are ten exams in all; their completion leads to the designation "Fellow of the Society," the highest credential that an actuary can attain.

Passing the first test were:
*Susan K. Haller, a 1984 MSU graduate from Fergus Falls.
*Patrick Larson, a junior from Moorhead.
*Steven Riewer, a 1984 graduate from Begley.
*Mark Rothmann, a senior from Moorhead.
*Beth Stone, a senior from Grand Marais.

Passing the second test were:
*Kelly Bretz, a 1984 graduate from Morris.
*Mark Rothmann.

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

Several research papers written by department members were published during the past year:

"D-optimal Cyclic Two-Dimensional Block Designs," by Ariyaratna Wijetunga of MSU and J. N. Srivastava of Colorado State University.
"A Note on Compact Metric Spaces as Remainders," by Don Mattson and James Hatzenbuhler.
"The Modulus of Continuity of the Distribution Function of φ(n)/n" by Dennis Rhoads of MSU and H. G. Diamond of the University of Illinois.
Alumni News

Susan Haller (B.S. 1984). Sue is teaching at Franklin Junior High School in Brainerd, Minnesota, where she also coaches girls' volleyball, basketball, and softball.

Stephen Versoi (B.S. 1978). A produce buyer and merchandiser for Nash Finch Company, Steve works in Sioux Falls, South Dakota. He and his wife, Barb, now have two children: Dan, 4, and Ken, 2.

Susan Owens Kanne (B.A. 1981). Sue is an Employee Benefits Consultant for the Wyatt Company in Eagan, Minnesota. Her work involves designing, installing, and ongoing administration of employee plans for clients in the twin cities as well as out-of-state. Sue and Dwayne Kanne (a 1982 MSU industrial studies graduate) were married in June, 1982.

Jerry K. Jensen (B.S. 1972). This is Jerry's first year as Superintendent of Schools at Goodhue Schools, Goodhue, Minnesota. Jerry, along with wife Susan and two year old daughter Jamie, moved into a different house last summer. Jerry says that moving, along with preparing for the new job, made for a very "interesting" summer.

Joseph Riesen (B.A. 1984). Joe is in his first year of graduate school at the University of Nebraska-Lincoln. He reports that his studies are going well and that he enjoys the mathematics department. The department is friendly and reminds him of MSU.

Jon Jellison (B.S. 1981). A double major in mathematics and computer science, Jon now is a Programmer/Analyst at NDSU where he is currently working on the Student Records System. Jon and Barbara Grant, a 1976 MSU graduate in computer science, were married last summer. Barb is a Systems Analyst at Blue Cross/Blue-Shield of Fargo.

Mary Mikkelson Block (B.A. 1981). Mary lives in Fargo, and is Dining Room Manager at the Perkin's Restaurant there.

Rebecca J. Vuchetich (B.A. 1982). Since June, 1984, Becky has been an Associate Programmer for Sperry in Roseville, Minnesota. After ten weeks of training she was thrust into the mainstream of a Software Development Group working on the FORTRAN part of a universal compiler for mainframe computers. Her husband Gerry is Assistant Sports Information Director/Photographer for Women's Athletics at the University of Minnesota.

Maris D. Shields (B.A. 1977). Maris has a double major in mathematics and chemistry. She is a Chemist with the Office of the State Toxicologist in Fargo.

John McDonald (B.S. 1976). John teaches math at Warren (Minnesota) High School along with coaching football, track, and girls' basketball. To ensure that his summers are busy he is a Driver Education and Motorcycle Safety Instructor. John's wife, Kristil (Cain), a 1976 MSU graduate who majored in special education, also teaches at the high school. Mark and Kristil have a daughter, Lori Ann, 4.

Merilee Susat Potucek (B.A. 1982). Merilee and husband Mark live in Thief River Falls where Mark farms and Merilee is a Bookkeeper/Receptionist for Charlson and Marben, P.A.

Dan Heiraas (B.S. 1981). This is Dan's fourth year in the Lester Prairie Public School System where he teaches "everything from seventh to twelfth grade math" and coaches girls' basketball and boys' baseball. Dan and wife Christine, who works at Waconia's First National Bank, have a daughter, Lindsey.

Carol Cossette Mazingo (B.S. 1972). Carol is a computer science teacher at Jacksonville High School, Jacksonville, North Carolina. Recently she was honored with a $1,000 scholarship from the State of North Carolina to further her studies in computer science. Carol is married and has three children.
Marlys Kasprick Hanson (B.S. 1976). Marlys works at the Information Center of the University of North Dakota offering consulting services to the staff at UND and to anyone in higher education in North Dakota. She and Larry have been married for 8 years, have a 4 year old son Brent, and are expecting another child this fall.

William R. Johnson (B.A. 1982). A Mathematician/Analyst for Performance Evaluation, Bill is with the Navy Astronautics Group, and lives in Camarillo, California. He is active in a Speaker’s Bureau and has won awards for community speaking. Bill says: “I miss Minnesota, but living in California is great ‘fer sure—like tubular!”

Patricia Seffert (B.S. 1984). Pat, a double major in math and computer science, is an Associate Programmer with Sperry Corporation in Roseville, Minnesota. After attending a class in the San Francisco area, she is currently generating test lists for program cards to be used in Sperry computers.

Patricia Mahan Botner (B.S. 1973). Pat is married to MSU graduate Dan Botner. They live in Garfield, Minnesota, and both work in Alexandria. Pat is a Related Mathematics Instructor at the Alexandria Area Vocational Technical Institute, while Dan is a Designer/Salesman with Creative Cabinets. They are happy to be in the Alexandria area, and purchased the Botner “homeplace” in 1981. Pat and Dan live just four miles south of the Brandon exit on I-94 and invite friends who are passing by to stop and visit.

Mark R. Myhre (B.S. 1984). Currently developing application software for database oriented systems, Mark is a Programmer in Corporate Data Processing with Cargill Incorporated of Minneapolis. He enjoys his work and has been with Cargill since last June.

Donnie Schwartz (B.S. 1982). Donnie received her M.S. in Statistics from the University of Iowa in May, 1984. She then took a position with Henry Ford Hospital in Detroit where she helps investigators with designing, conducting, and analyzing experiments in clinical and laboratory research.

Bill Kath (B.S. 1973). A Supervising Programmer for Sperry Corporation in Roseville, Bill is in charge of a group that has written a new COBOL compiler for Sperry’s large scale computers. The compiler has just been released and the group is in the process of maintaining it and adding some new features. Bill and wife Jo Ella, who is also employed by Sperry, have two children, Krista, 4, and Brent, 2.

David Bergstrom (B.A. 1979). Dave is an Assistant Actuary at Western States Life in Fargo where he has worked since graduating from MSU. He has now passed 9 in the series of 10 examinations that are required to become a Fellow of the Society of Actuaries, the highest recognition that an actuary can attain.

Julie Carlson Henry (B.S. 1979). Julie and husband Scott, a 1980 MSU grad who is employed by Minnesota Public Radio, live in Roseville, Minnesota, where Julie is employed by Hewlett-Packard. She recently made the move to a sales position in the company and is responsible for selling business computers and software to 3M’s Life Sciences Sector. Julie just received a five year service award at H-P.

Candace Johnson Harmer (B.A. 1973). A Scientific Programmer for Sperry in Roseville, Candace is in charge of one component of a machine-transferable software system that contains two compilers, assembler, system generator, simulator, and utilities. Candy and her husband Bruce, a 1973 MSU graduate in HPER, have three children, 7 year old Heather, and Jason and Jonathan, 4 year old twins. Candy works part time—3 days a week—so that she has time to spend with her family.

Stephen Cyr (B.S. 1978). Steve works for IBM in Rochester, Minnesota. He is a Staff Programmer and works in the laboratory on new product development. Steve recently received a Management Recognition Award for organizing a corporate-wide users meeting. Steve and wife Susan are expecting their first child this spring.

Dean Vilmo (B.S. 1971). A District Manager for Aid Association for Luthers, Dean lives in Crookston, Minnesota. He has won many sales awards including being a four year member of the Million Dollar Round Table and a four year recipient of the National Sales Achievement Award. Dean and Mary Ellen have a 6 month old daughter, Alyson.

John Bisek (B.S. 1977). John, his wife Mickie (Bretz), and 2 year old daughter, Carly, live in St. Paul. He is a Systems Programmer with Sperry Corporation in Roseville.

Eric Jorgenson (B.A. 1980). Eric is an Engineer III with Edgerton, Germeshausen and Grier in Las Vegas, Nevada. EG&G is a prime government contractor involved in nuclear testing. Eric works in developing and implementing large data acquisition systems for recording test information. Wife Joyce is a Division Manager for the local Sears store and is consistently a leader in regional sales.


Don Karlgaard (B.S. 1972). Don, wife Cheryl, and three children enjoy country living on a lake six miles north of Brainerd. He teaches ninth grade math at Franklin Junior High School and is Head Men’s Basketball Coach at Brainerd Community College.

Doreen Nystedt (B.S. 1975). Doreen recently received her master’s in mathematics education at the University of Minnesota. She is a geometry teacher at Woodbury Senior High in south Washington County. Doreen also is departmental representative for the district mathematics curriculum team and building representative for the computer curriculum team.

Lynn Rude (B.S. 1973). Parts Manager and part owner of G & R Equipment, Lynn lives in Halstad, Minnesota. The business deals in farm equipment and handles several major product lines. Lynn was married in 1981 to Lee Ann Holland. They have one child, 6 month old Justin Lynn.
Robin Kremer Ladd (B.A. 1982). Robin lives in Charleston, South Carolina, and teaches eighth grade mathematics at Marrington Middle School. Additionally, she is Head of the Computer Department, Coach for Mathcounts, and Computer Club Advisor. In her spare time, Robin is working towards a master's degree in curriculum and instruction.

David W. Jacobson (B.A. 1980). Dave is in his second year as a Reliability Engineer with IBM in Rochester, Minnesota. Besides being involved in reliability studies, he participates in mathematical and statistical research projects and makes presentations at various IBM seminars and classes. A paper, “Nonparametric Analysis of Covariance,” that Dave co-authored with Dr. W. R. Stephenson while at Iowa State University was presented by Stephenson at last August’s meeting of the American Statistical Association. Dave and Deb Schroeder were married last summer—Deb is also a statistician and employed by IBM.

Laurie Harless (B.A. 1984). An Actuarial Assistant with the Prudential Life Insurance Company in New Jersey, Laurie is one of 40 actuarial “students” who work in the corporate office. Currently she is studying for the second of the actuarial examinations.

JoAnne Gerdes (B.A. 1979). JoAnne has moved back to Minnesota. She lives in Excelsior and works for IDS/American Express as Senior Pension Consultant. She has received her FLMI designation and is currently enrolled in the MBA program at the College of St. Thomas. JoAnne’s husband, Bradley, also an MSU grad, is employed in the Post Graduate Development Program of IDS/American Express.

Kari Moran Williams (B.A. 1982). Kari and family now live in Rockford, Illinois, where her husband was recently transferred as a branch manager for Ryder Truck Rental. Since the birth of their second daughter, Meagan, Kari has been at home enjoying the new baby and older daughter, Nicole, who is now 2.

Bob Van Deusen (B.S. 1978). A double major in math and computer science, Bob recently left his job as Senior Programmer with the First American Bank System of St. Paul to become Vice President at Merchant’s State Bank of Lewisville, Minnesota. Bob and Ann have a two year old daughter and are expecting their second child in July.

Steve Hardyman (B.S. 1982). Steve teaches mathematics at Cheyenne Mountain Junior High School in Colorado Springs, Colorado, and is a part-time instructor at the University of Colorado there. He is currently working on a master’s degree in applied mathematics at UCCS. Steve was married a year ago—he and wife Kathy have an 11 year old son, Michael.

Paul Krzyzaniak (B.S. 1984). Paul is an Assistant Data Systems Analyst with a division of Lockheed Missiles and Space Company. He is currently working towards full Air Force certification as a Data Systems Analyst. Paul says that the hiring boom for math majors is in full swing at his company.


Dean R. Harris (B.A. 1971). A Senior Computer Scientist for Computer Services Corporation in Arlington, Virginia, Dean is currently working on external interface testing of a large near real time database system. He just completed an M.S. in Information Systems Technology at George Washington University. Dean has been married for 10 years and has a 3 year old daughter.

Mary McIntyre Gustafson (B.A. 1975). Mary worked for four years before starting a family and becoming a homemaker. She keeps busy with daughters Kara, 4, and Hannah, 1, but still finds time to tend the books for a local business. Mary and husband Terry, also a 1975 MSU graduate, live in Solon, Ohio, where he is a Research Chemist for Standard Oil of Ohio.

Steve Riewer (B.S. 1984). Steve lives in Bertha, Minnesota, where he is a High School Math Instructor for the Bertha-Hewitt schools.

Michael R. Halverson (B.A. 1976). Mike is a Systems Analyst with Flourware in the Jonathan Industrial Center at Chaska, Minnesota. Flourware manufactures semiconductor processing equipment and laboratory ware. Mike is married to Jane Wentzel, also a MSU grad. They have two children, Sarah, 5 and Ryan, 3.

David H. Sederquist (B.S. 1983). Dave lives in Minneapolis where he is an Operations Analyst at Northern States Power. Previously he taught junior high mathematics at Monticello. Dave began running in the Corporate Cup Series last summer and won one of four metro-wide corporate races. Last December, Dave married Jane Remark, a 1984 MSU accounting grad. She is employed by the accounting firm of Peat, Marwick, and Mitchell.

Harold Holum (B.A. 1972). Harold is Director of Software for Dimensional Medicine, Inc. in Eden Prairie, Minnesota. Dimensional Medicine is a 1983 Minnesota start-up company and Harold says that working for such a company is exciting as he is able to get involved in all phases of the company’s development. His advice to students is that “even though this may seem to be the world of computers, the bottom line is still that a strong knowledge of mathematics will be a great help in the high tech world we live in...

Jerry Abraham (B.S. 1981). Jerry is presently Computer Coordinator at Royalton High School, Royalton, Minnesota and part-time Director of Instructional Technology for the Mid-State Cooperative in Little Falls. He will move to a full-time position as Director next year, and is in the process of setting up a two-way interactive educational TV system to serve 7 school districts. In 1984, Jerry was named Teacher of the Year in the Bertha-Hewitt School System.

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