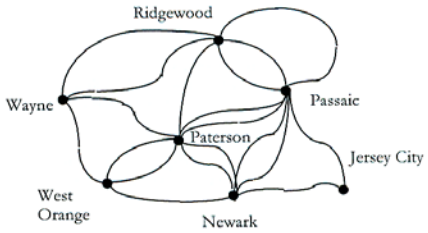
Fall 2005 MATYCONN Meeting/Workshop

Let's Be Discrete – Problem Solving with Drs. Ray McGivney & Jean McGivney-Burelle

at Three Rivers Community College

by Elaine Dinto, Naugatuck Valley

What do these problems have in common?



1. A graph of highways in northern New Jersey is given to the right. A plan must be devised to plow these roads after each snowstorm. To ensure that the roads are cleared as quickly as possible for emergency vehicles, the plan should permit trucks to leave the garage in West Orange, plow each road once and only once, and return to the garage. Can this be done? Explain.
2. You are chair of a Blue Ribbon Commission to recommend a policy. After many hearings, your committee finds that it has three options: (A) Allow unrestricted use of embryonic stem cell research; (B) Ban all use of embryonic stem cells; (C) Compromise by using only embryonic stem cells of embryos that are going to be destroyed. This results in the preference ballots shown. Based on this vote, which alternative should you recommend to the President (and why)?

A C B	B C A	C B A	A C B	B C A	B C A	C B A	A C B	B C A	C B A	A C B	A C B

3. Births are spread more or less randomly throughout the months of a year. Choose any 5 persons. I'll bet $1 that at least 2 of them were born in the same month. Use a simulation with twenty trials to decide whether you would take the bet.

The above exercises are a few of the engaging, real world problems co-presented by Dr. Ray McGivney and his daughter, Dr. Jean McGivney-Burelle, at the October 21, 2005 MATYCONN Workshop hosted by Three Rivers Community College, Mohegan Campus, Norwich. Participants solved network problems by "Eulerizing" a graph and using a "greedy" algorithm which extended our knowledge of graph theory. We used sequence mode on the TI-83+ to solve a wildlife management (recursion) problem, as well as the calculator's APPS feature to solve a financial math problem. We explored non-standard voting methods and saw that the winner of an election depends not only on the votes cast but also on the method used. Using the random integer generator on the TI as the model, we simulated "having babies, right here, right now" to solve the Chinese Birthday Problem (a proposed population control method limiting Chinese families to one son), as well as the Birth-Month Bet stated above and an example from a popular Board-Game. Jean, who co-presented with Dad for the first time, created and executed the PowerPoint; she assisted with explanations and solutions, while Ray continually interspersed bits of historical background, adding further interest to the problem situations through his knowledge, charm, and wit. The workshop was informative, challenging, and thoroughly enjoyable!

The above exercises and others explored at the workshop represent a few of the types of discrete math problems found in *Contemporary Mathematics*, Professor McGivney's textbook used at the University of Hartford. The roots of the text date back to 1988, when the state of Connecticut ruled that that all baccalaureate-granting institutions require a "broad liberal arts curriculum"; after that time, students at two of the University of Hartford colleges, both with international reputations as schools of performing and fine arts, were no longer free to concentrate exclusively on courses required for their majors, but for the first time were required to take a math course. The university's existing introductory level math courses (statistics, precalculus, a short course in calculus) did not seem appropriate for this audience, thus Ray and a colleague began to draft notes for a new course, giving rise to the current *Contemporary Mathematics*.

Realizing that the study of mathematics might be a low priority for this new set of students, many of whom either had a painful math history or simply did not like the subject, the goals of the course were to introduce students to topics not commonly found in the high school curriculum, to demonstrate the power of simple mathematical models, to concentrate on applications rather than theory, and to illustrate the usefulness of mathematical software.
While the course is taught at a mathematically sophisticated level, because of the choice of topics, strong algebra and geometry skills are not essential for success. The course, which has the largest math enrollment at the university, is now taken by those majoring in elementary education, fine arts, music and humanities; it is very popular on campus, especially welcomed by adult learners who have always had a fear of mathematics. The latest edition of *Contemporary Mathematics* consists of six independent chapters, related only by the fact that each focuses on applications of a mathematical model; these include voting methods, truth tables, set theory, simulation, recursive functions and graph theory.

When asked if he would share some personal and professional information with MATYCONN members, Ray proudly stated that daughter Jean had earned her PhD at UConn, in mathematics curriculum instruction, with a concentration in mathematics. Having taught at UConn for five years, then last year at Millersville, Pa., currently she is in her first year at the University of Hartford where she is directing the new secondary certification program, with the expectation of having the program open to students next academic year.

Ray gives his involvement in the MATYCONN workshop credit for bringing him out of the "dinosaur age." Admittedly the "low-tech" one, he confessed that he had planned to use transparencies at the workshop, but that Jean would not hear of this. Seeing how easily Jean put things together in PowerPoint, he welcomed the opportunity to learn from her; since then he discovered quickly that he could go to the internet during class for applets or pertinent information such as on voting issues, has learned Blackboard and plans to put all of his lessons on PowerPoint to make lessons more interesting and future updating quick and easy.

While his family necessarily moved around quite a bit when he was a child, Ray considers Auburn, Massachusetts, his hometown. He earned his Masters in Mathematics from Clark University in Worcester, then his PhD in Mathematics at Lehigh University, in Bethlehem, PA. He taught for six years at Lafayette College in Easton, a liberal arts and engineering college, before moving to Connecticut in 1970 to take a job nearer his and his wife's roots, at the University of Hartford.

Founded in 1877, the University of Hartford was chartered in 1957, under the governorship of Abraham Ribicoff, in the joining of the Hartford Art School, Hillyer College, and the Hartt School of Music. All looking for appropriate space, each offered something to the merger and together they formed a unique combination of curriculum and teaching disciplines to serve the

greater Hartford area. In 1970, Ray was one of six new hires in the Mathematics Department which was being reorganized at that time. The university moved from the streets of Hartford to the Bloomfield Avenue campus in West Hartford. Today that campus consists of 340 acres and serves as the center of the university, attracting more than 7000 students from 46 states and 54 countries, who are enrolled in 86 undergraduate majors and 32 graduate programs.

Arriving at the University of Hartford at such an exciting time, Ray embraced the opportunity afforded him to shape the future of the department. A Professor of Mathematics, he has served the campus in other capacities, including acting Dean of Students twice during the 1970's and Department Chair from 1981-1988.

When asked how his *Contemporary Mathematics* text has evolved over the years, Ray answered that, for one thing, it has evolved technologically: originally it was used in conjunction with math software from Dartmouth College called "Discrete Math." As graphing calculator capabilities grew and using the computer became unwieldy, a switch to the TI-83+ took place. Linear programming, probability and statistics were omitted, as was some work pertaining to set theory which could not be done on the calculator, but applications of the Fibonacci sequence to music and art and simulation topics were added. Word has gotten around, students finally see how math is used and realize it makes sense, and they love the course!

Besides working full time at the University, Ray has worked nonstop to promote mathematics in the larger community. He speaks at one or two conferences per year, has done numerous talks for ATOMIC, and has presented at CAMPY for years. One major project was an "On-site, In-service" project sponsored by PIMMS (Project to Increase Mastery of Mathematics and Science) from 1992-1994, where math and science teachers went into twelve different high schools throughout the state, inner city to suburban to rural, from Waterbury to E. O. Smith in Storrs, Weston to East Granby; they spent 10-12 full days per year working closely with dozens of high school teachers, giving workshops, writing curriculum, introducing appropriate uses of the graphing calculator. Another major event involved consulting in several area towns regarding middle school curriculum, what's important and what's not, strategies to accommodate different learning styles, and giving summer workshops involving inter-district, residency programs for kids.

Ray now is spending more time writing at his Enfield home. Three of his four children and his seven grandchildren, ages 9-1, live in the area, so he is able to enjoy their many visits. He loves to garden, where his interest has shifted from vegetables and annuals to landscaping and more "low maintenance" gardening including perennials and shrubs. Another new hobby is film and video editing; the proud owner of an iMac, he shares this hobby with his wife. He laughed thinking of his family's reactions as "McGivney launches his videos..."

When asked if he had any other comments he would care to share, Ray humbly responded "Thanks to MATYCONN for the hospitality. I enjoyed the experience and hope to see you again down the road."

If you have any questions regarding the University of Hartford's Contemporary Mathematics course, you way write to Ray at *mcgivney@hartford.edu*. Note: This writer is truly grateful to Professor McGivney, not only for his time in presenting at the MATYCONN Workshop, but for graciously answering all of my questions in his warm and friendly manner, and for permission to quote from *Contemporary Mathematics* for this article. May the wind be ever at your back, Ray!