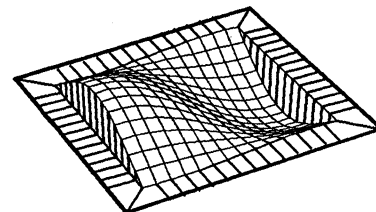# MUDD
MATH *

Volume 2, No. 1
November 1985

This newsletter, which is a collabortive effort of the HMC math faculty, alumni and students is our way of sharing news about mathematical activities at HMC or by HMC alumni wherever they may be. [The news you miss reading in the extensive coverage given to Mathematics by the Green Sheet or the HMC Alumni News.]

MATHEMATICS ALUMNI NEWS

by

Courtney Coleman

Please send any interesting news about our alumni to Professor Courtney Coleman.

Jon Gayek '79 stopped by Mudd this summer on his way to Western Australia where he collaborated on a research project in control theory. Jon is an assistant professor at Trinity University in Texas and directed their student team to a prize-winning effort in the national Mathematical Modeling contest last spring.

Mike Teel '69 was a labor organizer for the last seven years but now manages typographic software for CAMEX in New York.

Karl Moerder '79 and **Dan Newman '85** made generous gifts to the department towards the purchase of a laser printer. Now we are all learning the ins and outs of T_EX, and our preprints are as elegant as our mathematics.

John Velling '80 just finished his Ph.D. dissertation at Stanford in spherical geometry and the Schwartzian differential equation. He and **Alec Norton '80** think Claremont should add algebraic geometry to the curriculum, as well as differential geometry [the latter is now offered here every year].

Randy Mar '81 came up from San Diego to interview mathematics seniors for positions with VERAC, while **John Lavrakas '74** and **Lindy Resner '78** did the same thing for Logicon. **Doug Streuber '69** tried to lure Mudders to Hughes, Canoga Park. Hilda Larson reports that **Bill Helliwell '66** and **Len Daly '80** will be here in October to recruit math graduates for Arete Associates in Sherman Oaks. Has industry discovered, or rediscovered all the good things mathematics and mathematicians can do???

How many of us can claim to have solved an ancient problem? Two years ago **Jerry Tunnell '72** did just that. The problem is to find a test by which one can decide whether

---

* After the first issue of this newsletter appeared last spring some alumni objected to our unimaginative choice of name. Do you have a better one? All names submitted by the end of this year will be considered carefully by a partial and biased panel of judges. If a better name is received, the new name will be adopted in the future and a mystery prize will be awarded to the submittee.

an integer N is the area of some right triangle whose sides have rational lengths. An integer with this property is said to be *congruent.* 6 is congruent since it is the area of the 3, 4, 5 right triangle. Euler showed that 7 is congruent, while Fermat proved that 1 is not. Jerry's test for the congruence of any odd and squarefree N is simple, but mysterious: If N is congruent, then the number of integer solutions of $2x^2 + y^2 + 8z^2 = N$ must be twice the number of integer solutions of $2x^2 + y^2 + 32z^2 = N$. The converse is also true [almost].

Steve Grantham '77 seems too young to write his memoirs, but he has done it anyway. Memoir #316 of the American Mathematical Society has his name on the cover under the intriguing title: Galvin's "racing pawns" and a well-ordering of trees. Nice mathematics, but the title suggests that Steve is playing chess for the Weyerhauser Company. **Dan Kalman '74** has deserted academia (temporarily?) for the moneyed fields of industry. The Aerospace Corporation in El Segundo has lured him back to California.

The law and mathematics – an unusual pairing, or maybe not if you believe both rely on logic, or at least argumentation. Anyway, there is a new addition to the list of Mudders who have entered the legal profession from mathematics. **Steve Rockey '78** went directly from a Ph.D. in applied mathematics at Brown University into law school. Now he has a law degree from the University of Washington and has joined a large law firm in Seattle. He joins **Dana Nitz '77, Mike McCoy '71, John Mercer '71, Pete Paterno '72** and **Dave Barry '71** who are "mathematical" lawyers as well. If you are charged with dividing by zero, maybe this legal sextet can base your defense on the L'Hôpital precedent.

Ted Chinburg '75 recently received a Sloan award to support his research work – quite an honor since the awards go only to "young scientists of unusual ability". Ted is on the mathematics faculty at the University of Pennsylvania.

Jack Cuzick '70 visited HMC recently. He directs the statistical methodology group for the Imperial Cancer Research Fund in London. **Connie Weeks '70** is back at at JPL after a couple of years on the Aeronautical Engineering Faculty at Princeton.

Dana Hobson '85 received a Hertz award for graduate work in applied mathematics at a certain institution 25 miles to the west of Mudd. The Hertz largesse is legendary, and Dana will be living on champagne and caviar instead of the usual graduate student fare of beer and beans.

Allan E. Haenisch passed through HMC in early October. He's still with Anser in Arlington, VA, but was recently promoted to Area Manager for Strategic Aircraft. He was out here for a meeting at March AFB representing the Air Staff at the Pentagon.

1985 MATH MODELING CONTEST

The two HMC trios of math majors, **Scott Bailey '85, Dana Hobson '85, David Ho '86,** and **Tony Harrington '86, Duff Howell '86, Kurt Overley '86** accomplished what no other college or university did – placed respectively, in the top four and the top twelve, in the first running of the national Math Modeling. No mean feat considering the competition with teams from Cal Tech, Harvard, Berkeley, and about 100 other colleges. Unlike the Putnam Competition, this contest lasts three days and places a premium on

teamwork and use of library and computer resources although no one outside the team may be consulted. Both teams elected to work on optimal harvest problems, one choosing salmon and the other deer. The team report on optimal deer hunting policies is scheduled for publication in the Journal of Mathematical Modeling. **Stavros Busenberg** advised the team, and helped them to prepare for the 72-hour effort.

THE BUDAPEST SEMESTERS IN MATHEMATICS PROGRAM

by

Daniel Newman '85

Last spring I had the pleasure of participating in the Budapest Semesters in mathematics program. This program is intended for third and fourth year undergraduates interested in discrete mathematics – an area of math in which the Hungarians are quite famous. The instruction is in English and the professors are among the best in their fields. As the program is limited to about twenty students per semester (fourteen students total participated the semester I did), the classes are all small. While classes focussing on combinatorics, graph theory, information theory and other areas of discrete mathematics are the academic highlights of the program, courses in algebra, complex analysis, number theory and other topics are offered. In addition, several humanities classes are taught each semester. The classes are all taught at a fairly advanced level and pace and are transferrable to MUDD. Due to the limited number of participants and variations in their interests, it is hard to know in advance exactly what courses will be offered each semester.

The program has more to offer than just Hungary's strength in discrete math. Hungary is a country rich in European history and the experience to be gained by living in a foreign country (behind the iron curtain) is worth the trip alone. Even though Hungary is a communist country it is very Western and liberal. I was free to do as I pleased while I was there. The city of Budapest is full of things to do and see, the people are quite friendly, the cost of living very low and the transportation system is better than in any American city. The countryside is quite accesessible and it is quite easy to travel to other parts of Hungary and neighboring countries. (Vienna is only a few hours away by train.)

The entire cost of the program (transportation, tuition, cost of living and incidentals) is about \$3500 – less than the cost of a semester at Mudd. I recommend the program to anyone interested in discrete math who has a good background in pure math.

PROBLEM PRIZE CONTEST 1985

Show that for $0 < \epsilon < 1$, the expression $(x + 1)^n(x^2 - (2 - \epsilon)x + 1)$ is a polynomial with negative coefficients if the positive integer n is sufficiently large. For $\epsilon = 10^{-3}$, find the smallest such n.

Solutions of this problem may be submitted to Professor M. Henriksen at any time until 5 p.m. on Friday, December 13, 1985. The "best" solution received by this date will be awarded a prize of \$50, on the basis of the rules given below.

1. The prize will be awarded to the HMC undergraduate who submits the most elegant, best written solution by the announced deadline.
2. If no HMC undergraduate submits a satisfactory solution by he announced deadine, then the prize will be awarded on the same basis to an HMC alumnus.
3. If no HMC undergraduate or alumnus submits a satisfactory solution by the announced deadline, the prize will be awarded to any HMC faculty member or staff member not employed by the Mathematics Department.
4. The best satisfactory solution or solutions will be published in the next issue of the Mathematics Newsletter if one is submitted by the announced deadline. Otherwise, the problem will be recycled.

PROBLEM PRIZE CONTEST 1984

Eighteen solutions of the 1984 problem were received; 12 from undergraduates and 6 from alumni. Of these 11 were correct (including all 6 of the alumni solutions). The winner was **KARL WEE '87**, who at that time was a sophomore majoring in Engineering. Problem 1 and Mr. Wee's solution are reproduced below.

PROBLEM 1: *Prove or disprove: There is at least one straight line normal (perpendicular) to the graph of $y = \cosh x$ at a point $(a, \cosh a)$ and also normal to the graph of $y = \sinh x$ at point $(b, \sinh b)$.*

FACTS:

1. $\cosh x = \frac{1}{2}e^x + \frac{1}{2}e^{-x} > \frac{1}{2}e^x - \frac{1}{2}e^{-x}$ (Because $e^x > 0$ and $e^{-x} > 0$ for all x). Thus, $\cosh x > \sinh x$ for all x.
2. (a) $\frac{d}{dx}(\cosh x) = \frac{1}{2}e^x - \frac{1}{2}e^{-x} = \sinh x$.
   (b) $\frac{d}{dx}(\sinh x) = \frac{1}{2}e^x - (-\frac{1}{2}e^{-x}) = \cosh x$.
3. (a) $\cosh x > 0$ for all x.
   (b) Therefore, $\frac{d}{dx}(\sinh x) > 0$ for all x.
4. Divide the xy-plane into two regions: Region I: $y > \sinh x$, and Region II: $y \leq \sinh x$. Let C_1 be $y = \cosh x$ and C_2 be $y = \sinh x$. Then L lies entirely in region I because if there were any point on C_1 in region II, $\cosh x$ would be less than or equal to $\sinh x$ for a certain x, which would violate Fact 1.

Now no matter where on C_2 we draw a normal from, it will not intersect with C_1 at a point where the tangent is parallel to the line from which the normal is drawn. Indeed, suppose Suppose L meets a point $B = (b, \cosh b)$ on C_1. Because of the direction in which we extend L, $b < a$. Let the slope of the tangent at B be m_b.

From fact 2(b), $m_a = \cosh a$. (defined for all a).

From fact 1, $(m_a =)\cosh a > \sinh a$.

From fact 2(a), $m_b = \sinh b$.

From fact 3(b), because $b < a$, $\sinh b < \sinh a$.

Therefore, wherever we draw L from

$$m_b = sinh\ b < sinha < cosh\ a = m_a$$

$$\Rightarrow m_a \neq m_b,$$

q.e.d.

Proof. If there exists any straight line which is a normal to C_1 and also a normal to C_2, it is implied that we are able to draw from a point A on C_2 a normal which extends to a point B on C_1 and is perpendicular to the tangent at B. Since the tangent at A and the tangent at B are both perpendicular to the same straight line, it is obvious that the two tangents are parallel.

I will prove that we are **unable** to draw from any point on C_2 a normal which intersects with C_1 at a point whose tangent is parallel to that at the point we draw our line from, i.e., **no** such straight line as described in the question exists.

Take an arbitrary point $A = (a, sinh\ a)$ on C_2 and draw a normal L. From fact 3b, slope of tangent at $A = (\equiv m_a) > 0$, i.e., slope of L $(\equiv m_1) = -I/m_a < 0$.

Therefore, if we follow L we either decrease in x and increase in y, or increase in x and decrease in y. The following proves that in the latter direction we will never meet C_1:

At A, $x = a$ and $y = sinh\ a$. As we go on, $x > a$ and $y > sinh\ a$. From Fact 3b it is obvious that $sinh\ x > sinh\ a$ for $x > a$. Therefore as we follow L, $y > sinh\ a > sinh\ x$ and we are always in region 2. From fact 4, we will never meet C_1.

It is clear, therefore, that if we are to meet C_1 at all, we must extend L in the other direction.

FACULTY NEWS
by
Melvin Henriksen

Professor **Stavros Busenberg** gave a talk at Oberwolfach, Germany in December, 1984, participated in a panel discussion at CSU, Northridge at a joint meeting of the Mathematical Association of America and the Society of Industrial and Applied Mathematics (SIAM) last March, gave a talk at Pan American University last May, and at theSIAM meeting at Tempe, Arizona in October, and will give talks at Hiroshima University at the University of Kyoto in Japan and at the California Institute of Technology in November.

Professor **Robert Borrelli** has returned from a sabbatical leave in 1984 at L'École Supérieure d'Ingénieurs en Électrotechnique et Électronique (ESIEE) in Paris, France. He was visiting Professor of Mathematics and worked closely with both the mathematics and automatic control departments. He has resumed his duties as Department Chairman and is in the last year of a five-year term. (For more information about the ESIEE, see the

story "ESIEE and Mudd may Wed"). During 1984-85, he gave talks at the Conservatoire Nationale des Arts et Métiers, in France, and the Universty of Trento and the Centro Studi e Applicazioni Avanzante, in Italy.

Professor **Courtney Coleman** published a paper **Boundedness and unboundedness in polynomial differentil systems** in the **Journal of Nonlinear Analysis** and is preparing other papers for publication (see the column **Technical Reports**).

Professor **John Greever** spent a sabbatical leave in 1984-85 in Vancouver at the Institute of Animal Resource Ecology, University of British Columbia. His time was spent partly sitting in on various ecology classes and seminars, and partly modelling populations of African ungulates (such as white-eared Kob and wildebeest). The point was to understand how and why migratory life styles increase the carrying capacities of populations. This research is in the process of being written up for publication.

Professor **Melvin Henriksen** gave talks at San Francisco State University in November, 1984, his co-author Jane Day gave a talk at the meeting of the American Mathematical Society held in Anaheim, California last January. He attended the meeting of the Spring Topology Conference held in Talahassee, Florida in March, gave a series of three lectures in Barcelona, Spain in June, gave a talk at the Miniconference on limits held at the City College of New York in July, and visited the University of Manitoba in Winnipeg for a week in August. He was co-author of four technical reports, and one of his papers appeared in a volume, **Rings of Continuous Functions**, published by Marcel Dekker Publishing Company in early 1985.

He was program chairman of the Southern California chapter of the Mathematical Association of America and ran the meetings of that organization held at San Diego State University in November 1984 and the California State University in Northridge in March. He is also a member of two committees of the American Mathematical Society.

Professor **Alden Pixley** attended a two-week conference at Stanford University in July on Logic, Languages, and Computation. He also has a paper "Principal Congruence Formulas in Arithmetic Varieties" that will appear soon in a conference proceedings published in the Springer-Verlag lecture series.

Professor **Alvin White** wrote an article "Teaching Mathematics as Though Students Mattered", which appeared earlier in a book, which will be reprinted in the CAEL (Council for the Advancement of Experiential Learning) Newsletter in the near future.

NEW BLOOD AT MUDD

Dave Fisher is a new tenure-track assistant professor of Mathematics. In August 1985, he received his Ph.D. in Applied Math from the University of Maryland. In May 1980, he received his B.S. in Applied Math from a very small mathematics, science and engineering school in Southern California that you probably never heard of. He specializes in parallel processing, discrete mathematics and numerical analysis.

6

VISITING PROFESSORS OF MATHEMATICS AT HMC

This has been the second year of the Sloan Visitors Program sponsored in part by a Sloan Foundation grant to the HMC Mathematics Clinic. Again this year we have attracted a number of eager and able visitors from the "New Liberal Arts" colleges. **Mario Martelli** hails from Bryn Mawr College in Pennsylvania where he is directing a massive multi-media effort to develop technological literacy materials for mathematics and physics. Technically, Mario might be considered a "returnee" since he was a visitor in the spring, 1985, and found the experience so worthwhile that he decided to extend his stay for the entire year 1985-86. **Larry Knop** from Hamilton College, New York, was also a Sloan Visitor in the spring, 1985, and has returned for the fall semester, 1985 to complete his year's visit which straddled the summer. **Jerry Roberts** is on leave from Davidson College in North Carolina, where he is the lone member of a small department who has an applied mathematics background. Jerry's undergraduate degree is in Engineering Physics and is involved in developing computer programming and modeling courses. **Bob Kozelka** is our second visitor from Williams College in Massachusetts (the first being **Guilford Spencer** in 1984-85). Bob is a statistician and currently the "Chaircreature" of the Department of Mathematical Sciences at Williams. Bob's research work is mostly in the area of quantitative anthropology (would you believe that Bob has done some joint work with Ralph Bolton of Pomona College's Anthropology Department?). **Don Small** is our second visitor from Colby College in Maine (**Ken Lane** was our first visitor from that college in 1984-85). Don also works in the area of discrete mathematics and has been an indefatigible visiting lecturer, panelist, short course and workshop organizer for the MAA and the Association of Teachers of Mathematics. Don is currently the Governor of the Northeast Section of the MAA.

Another visitor this year is **Rosa Maria Loguercio-Polosa** who hails from the School for Advanced Studies in Industrial and Applied Mathematics (SASIAM), the educational arm of the Centro Studi e Applicazione in Technologie Avanzate (CSATA) in Bari, Italy. SASIAM wishes to start a clinic program which will be closely modeled after the HMC Mathematics Clinic and Rosa is the first of a series of SASIAM students who will carry first-hand clinic experience back to Bari. As CSATA wishes to acquire MATHLIB, Rosa will also spend a good portion of her time here in building expertise in the operation of that software package.

ESIEE AND MUDD MAY WED?

The ESIEE (École Supérieure d'Ingénieurs en Electrotechnique et Electronique) is a private school of engineering in Paris, France supported by the Paris Chamber of Commerce. It is about the same size as HMC, but is devoted entirely to a 5-year program in electrical engineering – and it has a clinic program very similar to our own. It is considered to be a **Grands École** (L'École Polytechnique, the most prestigious of the Grands Écoles, is supported by the French Department of Defense). Roughly half of every electrical engineer's program is devoted to mathematics courses, including, besides the obvious ones, courses in topology, modern algebra, set theory and logic, distribution theory (á la Laurent

Schwartz), Stochastic Processes and Operations Research. HMC and the ESIEE are in the process of working out a formal agreement on exchange of faculty and students which should be ready soon. If you would like more information on the exchange program please contact Professor Borrelli.

THE MATHEMATICS COLLOQUIUM OF THE CLAREMONT COLLEGES

The colloquium is unusual in several respects. It is the result of a cooperative effort on the part of all of the Claremont Colleges (except for Scripps which has no mathematician on its faculty) and has been meeting weekly during the academic year since 1969. Most of its speakers come from outside Claremont, and are encouraged to make at least part of their talk accessible to undergraduates. The talks are usually held on Wednesdays at 4:15 p.m. on either the Pomona or HMC campus,(this spring they will be held at CMC) are preceeded by a pre-colloquium reception and followed by a post-colloquium reception so students and faculty can meet the speaker on an informal basis. This academic year's speakers have included Professor Garrett Birkhoff of Harvard University and Professor Bixby of Rice University. From 1983-85, the Colloquium Chairman was Professor **Sandy Grabiner** of Pomona College, and this year this post is being shared by Professors **Ellis Cumberbatch** of the Claremont Graduate School and our own Professor **Alden Pixley**.

Financing the Mathematics Colloquium is also a cooperative venture with contributions coming from the various Claremont Colleges, the Claremont University Center, and from individual faculty members.

If you want to be on our mailing list, or have suggestions for interesting speakers, please let us know (most of those that we get from far away are "passing through" the Los Angeles areas; we can't afford to import them on our own). We appreciate any support we can get for the Mathematics Colloquium from ay source – especially from our alumni.

THE AMS AND MAA MEET IN CLAREMONT

On November 8 and 9, the American Mathematical Society and the Mathematical Society will be meeting in Claremont; actually, all sessions will be held on the HMC campus. There are a number of special sessions and invited speakers. In particular, Professor **Sandy Grabiner** of Pomona College will address the MAA on **Radical Banach Algebras**, Professor **Ellis Cumberbatch** of the Claremont Graduate School will lead a special session on Industrial Mathematics and Professors Stavors Busenberg and Ken Cooke will lead one on differential equations for the AMS.

Professor **Melvin Henriksen** and Professor Harry Mullikin of Pomona College are in charge of local arrangements. For more details, see the October 1985 issue of the **Notices of the American Mathematical Society**.

HMC MATHEMATICS TECHNICAL REPORTS

For several years, members of our department have been writing technical reports on their research which have been circulated internally. A list of those written since 1982 is

8

given below. Any of you wishing a copy of any of them can obtain one by paying a $2.00 handling fee for each one desired; please make your checks out to the Harvey Mudd College Mathematics Department.

8/85 *"Nearly psuedocompact extensions"* by Melvin Henriksen and Rayburn.

8/85 *"Identifiability of time dependent linear system"* by Stavros Busenberg, Suzanne M. Lenhart, Curtis C. Travis.

8/85 *"A system of nonlinear degenerate parabolic equations"* by Stavros Busenberg, Mimmo Iannelli.

5/85 *"Posituve eigenvectors of wedge maps"* by Mario Martelli.

4/85 *"Quasi-f-covers of Tychonoff spaces"* by M. Henriksen, J. Vermeer, R.G. Woods.

'85 *"New issues in the computational complexity of linear programming"* by Kenneth D. Lane, John Goulet.

12/84 *"Iterative solutions of systems of linear equations whose coefficient matrix is positive real"* by Melvin Henriksen, Jane M. Day.

11/84 *"Ordered products of topological groups"* by M. Henriksen, R. Kopperman, F. A. Smith.

6/83 *Principal congruence formulas in arithmetical varieties* A.F. Pixley.

6/84 *"Separable models in age-dependent population dynamics"* by Stavros Busenberg,Mimmo Iannelli.

6/84 *"Interaction of spatial diffusion and delays in models of genetic control by repression"* by Stavros Busenberg, Joseph Mahaffy.

1/84 *"Bifurcation phenomena in biomathematics"* by Stavros Busenberg.

12/83 *"MATHLIB - A library of tools for mathematical modeling, analysis, data manipulation and presentation"* by Ned Freed, Kevin Carosso.

9/83 *"Poe's Pendulum"* by Robert L. Borrelli, Courtney S. Coleman, Dana D. Hobson.

9/83 *"Boundedness and unboundedness in polynomial differential systems"* by Courtney S. Coleman.

9/83 *"Futile cycles and the Hopf Bifurcation"* by C.S. Coleman, J.C. Frauenthal, D.D. Hobson, D.C. Newman, K.W. Saints.

8/83 *"Automated attribute optimization for VLSI systems'* by Ken Cline, Mel Cutler, Carl Kessleman, Gary York.

8/83 *"A class of nonlinear diffusion problems"* by Stavros N. Busenberg.

6/83 *Some remarks on the two discriminators"*, A.F. Pixley.

3/83 *"Conservation of energy in large-scale macroeconomic systems"* by Christopher L. Cagan.

2/83 *"Energy and entropy in microeconomics"* by Christopher L. Cagan.

2/83 *"A degenerate nonlinear diffusion problem in age-structured population dynamics"* by Stavros Busenberg, Mimmo Iannelli.

12/82 *"Models for a class of man-environment epidemic diseases"*, by V. Capasso.

11/82 *"Stability conditions for linear non-autonomous delay differential equations"* byStavros N. Busenberg, Kenneth L. Cooke.

9/82 *"Analysis of a model of a vertically transmitted disease"* by S. Busenberg. K. Cooke, M.A. Pozio.

1981-82 *"Satiable egg-eating predators"* by Courtney S. Coleman, James C. Frauenthal.

UPDATE ON MATHLIB

For those of you who aren't familiar with MATHLIB the following excerpt from the MATHLIB brochure gives a good description:

"MATHLIB is a general-purpose mathematical modelling system that fills the need for an analysis tool which is simple enough for an inexperienced user but sophisticated enough to cope with complex problems encountered in mathematical and scientific research. Whether the work at hand involves graphing a set of simple data points or solving a large system of differential equations, MATHLIB is a very effective tool for obtaining accurate results in a useful format.

MATHLIB's powerful solvers can accomodate models expressed in many different ways, including nonlinear equations, differential equations, integral equations and difference equations. Models are entered as mathematical expressions via a user-friendly command interface which includes a symbolic manipulation facility.

MATHLIB easily handles large data sets. Facilities are provided to store, retrieve, transform, analyze, and fits models to data. Using TEMPLATE* as its graphics subsystem, MATHLIB can produce graphics output on over 100 different graphics devices."

The Math Department's Vax 750 (named YMIR after an obscure but powerful Norse God) is now running VMS** Version 4.2. This and the fact that TEMPLATE has gone into a new release, Version 5.0, has recquired us to produce yet another version of MATHLIB – Version 10.2. This new version of MATHLIB was designed to operate under version 4.0 or higher of VMS and will not run with VMS version 3. MATHLIB 10.2 has been recompiled using VAX Pascal version 3.1 and VAX Fortran Version 4.2. This release of MATHLIB has fixed a number of bugs and incorporates a number of performance enhancements – most programs should run 10 to 20% faster now. YMIR continues to be the primary development site for the MATHLIB project.

Last summer the department acquired a QMS 800 laser printer which now serves users of YMIR as a device to support highly sophisticated graphics and typesetting software. This made it worthwhile to bring up T_EX on YMIR (as many of you know, T_EX is an intelligent computerized typesetting software package developed at Stanford by Donald Knuth). Many HMC faculty are discovering that T_EX gives them superb quality text and graphics (via MATHLIB) on the QMS 800 for their technical papers. Many journals will photo offset directly from T_EX generated output. This newsletter has been produced with T_EX.

In November, YMIR will become a known site on BITNET, a network connecting academic computers world-wide. If you want to send us messages our BITNET address is simply YMIR prefixed by the name of the person for whom the message is intended, followed by a @ sign.

---

* TEMPLATE is a trademark of the MEGATEK Corporation

** VMS is a trademark of Digital Equipment Corporation

MATHLIB has been recently licensed to Xerox Corporation, and Hughes Corporation, and the Claremont Graduate School. They join Lawrence Livermore Labs, NASA-Ames, Honeywell, The Technion (Israel), Megatek Corporation, Pomona College and the Four College Computer Center (Pitzer, HMC, CMC, Scripps) as licensed users of MATHLIB. Licenses are pending for Westinghouse, CSATA (Bari, Italy), and the CNAM (Paris, France). If you would like to consider MATHLIB for your VAX, write to Bob Borrelli or Stavros Busenberg.