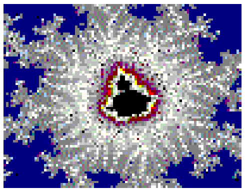


Sinclair Mathnet

March 2002 Volume 8, Issue 4

FROM THE CHAIR

In the last issue of *Mathnet* I reported on the attendance study that we did in Math 101 in the Fall Quarter. It showed that students attended class an average of only 78% of the time, that there is a very close relationship between performance and attendance and that of those students who attended at least 90% of the time, 82% had an A, B, or C and 96% passed! I then invited your input on the idea of requiring that our students attend at least 90% of the time. I asked if we should have a departmental attendance policy and how we should enforce it.

There has been a good deal of reaction to the article and the study. Lyn Keeler gathered some attendance policies at other institutions that you will find in this issue of *Mathnet*. A subcommittee of the college's Assessment Task Force, charged with trying to identify reasons that students are unsuccessful in some of our high enrollment, high attrition courses, has been persuaded by our study that poor attendance may be one of the biggest reasons for student failures. As a result they are planning to do similar attendance studies in at least two other disciplines with an eye toward the possibility of proposing institution wide attendance policies or guidelines. The Clarion has done an article on the topic in their March 4th issue. It reports many of the results from the study and alludes to the importance of attendance to student success. A colleague from the Biology Department writes, "At last – common sense quantified! Could we also suggest coming prepared to do college level work and studying?" A colleague from the Humanities Department advises me that the newsletter article was mentioned and complimented at the Board of Trustees Meeting and that some members were heard to comment on how important a lesson "showing up" would also be in post-college life. Dr. Sifferlin writes, "I think I would have the 90% (attendance policy) on every syllabus. What a correlation between attendance and student success. If you do not come to class, your chance of success drops dramatically…. I would have communication in the Math Lab on big attractive charts… (and in) math class-rooms."

However, I have not had much success in eliciting response from the Mathematics Department. Only one full-time faculty member and four part-timers have offered any input. (Don't worry, I get the message. When you read *Mathnet* you skip directly to Harvey's Joke Corner. "From the Chair" is useful only as a remedy when those frightful bouts of insomnia occur. But perhaps those of you now reading this in an effort to achieve blissful slumber could share the information with your more well rested colleagues who don't need my articles to combat their sleep deprivation.) Four of the faculty members shared with me techniques they used to encourage attendance and the other suggested a potential problem that a department policy might cause.

But I really would like to know what some of the rest of you think about a 90% attendance requirement. Maybe we need a specific proposal to get the discussion off the ground. OK, then, I propose the following:

In every mathematics class students are required to attend at least 90% of the class meetings. If they fall below this level, their final grade will be lowered by one letter grade. *(Continued on page 6.)*

Faculty Feature

The Mathematics Department will be saying good-bye to two long-time faculty members this year. One of the people who will soon join the ranks of the retired is Susan Myers.

Susan is completing her thirtieth year of teaching for Sinclair. Having come from graduate school in 1972, Sinclair has been her first and only full-time teaching position. She says, “That happened to be the year that Sinclair moved to its current campus, and many new faculty were hired. I am still in my original office on the third floor of Building 1.”

Susan did take a break from teaching during a sabbatical from 1985 to 1986, when she took some graduate classes in applied mathematics at the University of Dayton. An outcome of her sabbatical was the development of the Mathematical Modeling course, which she offers as MAT 151.

When asked what things she would like her colleagues to know about her, she said, “I have always wanted to be a teacher. I can remember ‘playing school’ with neighborhood friends as a child. Luckily, my parents encouraged me and sacrificed quite a bit to send me to college. It was a first in my family.” Susan earned a B.S. in Mathematics from Muskingum College in New Concord, OH, and an M.S. in Mathematics from Miami University in Oxford, OH.

Susan has been married to her husband Richard, whom she met right here in the Mathematics Department, for 25 years. Richard was a part-time teacher at Sinclair for over 30 years. Their first dates were spent playing tennis in the PAC. Susan has stepchildren and grandchildren in Dayton, Granville and Atlanta. Her parents, brothers and sister, and nieces and nephews reside in Canton, OH, where she was born, and in Massillon, OH.

There are many projects that Susan recalls over her thirty years at Sinclair. In the early 80’s, she and another faculty member put together a “Guided Individualized Program” in MAT 101 to allow students more time (or less time) to complete the course at a certain mastery level. The program was discontinued after three years, but she says, “Now, of course, there is the MAT 101 Project! That committee has worked so hard to come up with a successful alternative to the traditional style of instruction and we are hopeful we have found a good plan.” Susan has also been very involved in the introduction of graphing calculators and computers in 116, 117, Calculus and Differential Equations classes, starting back in the late 80’s.

It sounds like Susan will not lack for things to do after she leaves us. She and Richard have planned a cruise and land tour to Alaska in August to celebrate their 25th anniversary and her retirement. After that, she is going to “let life happen.” Hobbies that she hopes to pursue further are genealogy, bread baking, gardening and “maybe even golf!”

When asked what she will miss about Sinclair after retirement, her response is, “The people, of course. I’ve taught a lot of wonderful students and worked with a department of very pleasant, hard-working faculty!”

You can be certain that we will all miss you, too Susan. Best wishes on your upcoming retirement.

Susan Harris ■

Sue Myers works at her desk with student Melanie Mitchell.

WHAT DO OTHER COLLEGES DO ABOUT ATTENDANCE?

A quick survey of attendance policies posted on the Internet revealed a wide range of strategies. Most schools leave course policies up to the individual instructor, and most instructors used some variation of the policies currently used at Sinclair. A few schools had more strict regulations concerning attendance.

The Culinary Institute of America in California

Students who miss more than a specific number of classes automatically fail that course and repeat the entire course. Students who miss more than a specific number of classes throughout the two-year or four-year program will also be suspended. Students who miss eight classes in the freshman and sophomore years will be placed on attendance probation, reminded of the policy, and warned of possible suspension or dismissal by the dean of students. Because juniors and seniors normally attend three classes a day, students who miss 24 classes in the junior and senior years will be placed on attendance probation, informed of the policy, and warned of possible suspension or dismissal by the dean of students.

University of New South Wales

If students attend less than eighty per cent of their possible classes they may be refused final assessment.

American Language Institute

Students who are absent for more than twice the number of hours a class meets in one week will normally receive a grade of "No Credit." For example, if a class meets four hours per week, a student who has more than 8 hours of total absences during the semester would receive a grade of "No Credit." A student who is 15 minutes late or more for a class may be marked as absent for that hour at the discretion of the teacher.

Summer Class for Academically Talented HS Seniors at UC Berkeley

If you know in advance that you will miss more than two classes, you should not apply. Students who incur more than two absences may be dropped from the program. Students will be dropped if they miss the first two days of class.

College of Fine Arts, U of NSW

Students must attend all classes of courses in which they are enrolled; and where absences in excess of three classes occur, students may be given a fail grade.

Mississippi State University

Absences are reported to a special tracking program called Pathfinder, which funnels the names into a database. Any freshman who cuts classes more than twice is identified for an ever-so-gentle chat with school personnel. The missing-in-action freshmen are given a pamphlet with campus phone numbers and resources to help them with studies. But the student also gets a pointed reminder: Cutting class can damage or derail a college career.

City University in London

Specific attendance requirements are set out in the handbook for each course. Attendance will be monitored selectively and any student found to be absent without permission will be required to meet his or her tutor to explain the absence. Persistent absence without good cause will lead to an interview with the head of department and may lead to a decision that the student has dropped out of the course and should be withdrawn by the Registry.

For every course or group of courses a member of staff should be allocated responsibility for recording absence and initiating a recommendation for withdrawal, notifying the Registry, and setting out the reasons for withdrawal in the standard form.

p-Series, Sums and Apéry's Constant

Mathematics involves not only solving equations to solve applied problems, but also the study of mathematical patterns, structures and relationships through logical deduction. Mathematics has practical, technical and aesthetic aspects. In determining solutions to problems, how one determines a solution, the value of the solution, and how the solution is expressed all have significance.

Regarding how a solution is expressed, of great interest and enjoyment to mathematicians is in the determination of exact, closed form solutions or values to equations, integrals, infinite series, infinite products, continued fractions, etc. For example, by examining the limit of the partial sums, students learn in calculus that the sum of the geometric series

$$\sum_{n=0}^{\infty} ar^n \ , \ 0<|r|<1,$$

is equal to $\dfrac{a}{1-r}$. It is succinct, beautiful and efficient, and it is remarkable in that it uses, and only uses, both the first term of the series a and the ratio r of the series to determine the sum.

However, when the Integral Test is covered in class, students are shown only that a p-series

$$\sum_{n=1}^{\infty} \frac{1}{n^p}$$

converges if $p>1$. Students do not especially notice that we do not determine a formula for the sum of the series. They are satisfied that we used the Integral Test to determine convergence. I have never had a student ask whether they will learn a formula for determining the sum. In fact, the focus of the course generally shifts towards questions of convergence and not in determining sums, although with alternating series and with Taylor Series we can discuss the accuracy of the approximation of a sum.

A formula for convergent p-series is not included in calculus books for a reason. Though forms involving further series exist for certain values of p, they would not be easy for students to grasp or appreciate. For instance, when p is the positive even integer $2k$, then

$$\sum_{n=1}^{\infty} \frac{1}{n^{2k}} = \frac{(2p)^{2k}}{2(2k)!} \cdot |B_{2k}|,$$

where $\{B_n\}$ are the *Bernoulli numbers*, which are given by the generating function

$$\frac{x}{e^x - 1} = \sum_{k=0}^{\infty} B_k \cdot \frac{x^k}{k!}.$$

More illuminating, unbelievable and rewarding are the determined sums for positive even integer values of p, many that were first discovered by Leonhard Euler. In 1735, Euler determined the exact value of the p-series when p is 2, the so-called "Basel Problem," a problem posed by Jakob Bernoulli writing from Basel. Through non-rigorous methods by today's standards, but ingenious nonetheless, Euler showed that

$$\sum_{n=1}^{\infty} \frac{1}{n^2} = \frac{p^2}{6} \ .$$

Further, he determined how to find the exact sums of the p-series for positive even integers. For instance, he determined that

$$\sum_{n=1}^{\infty} \frac{1}{n^4} = \frac{p^4}{90}$$

and

$$\sum_{n=1}^{\infty} \frac{1}{n^6} = \frac{p^6}{945}.$$

By 1744 he had given the exact sums for positive even values of p up to 26,

$$\sum_{n=1}^{\infty} \frac{1}{n^{26}} = \frac{1315862}{1109448197\ 6030578125} p^{26}!$$

For a thorough account of Euler’s approach, read *Euler: The Master of Us All* by William Dunham, which would also be accessible to better students who are motivated towards mathematics.

Euler ultimately gave more than one proof of his discovery, and others have since emerged. One proof is even given in the February 2002 issue of *The American Mathematical Monthly*. In this issue Josef Hofbauer writes a note entitled “A Simple Proof of $1+\frac{1}{2^2}+\frac{1}{3^2}+\cdots=\frac{p^2}{6}$ and Related Identities.”

However, the sums for positive odd powers of p have resisted a concise, closed form determination. It would be sensational if someone found a precise connection between the sums of these p-series and π.

Mathematicians study the *Riemann zeta function* given by

$$z(z)=\sum_{n=1}^{\infty}\frac{1}{n^z},$$

z a complex number, and other related functions.

A major development, in 1979 Roger Apéry proved that $z(3)$ is irrational. The designation of $z(3)$ as Apéry’s constant is new but well deserved. However, no one has yet proven whether $z(2m+1)$ is irrational for $m \geq 2$. Odd exponents greater than 3 appear to present much more difficulties than 3 itself. It also remains open whether $z(3)$ is transcendental or whether $z(3)/p^3$ is irrational.

Just in 2000, Tanguy Rivoal proved that infinitely many values of the set

$$S=\{z(2m+1)\,|\,m\geq 2\}$$

must be irrational, though it is unknown which ones are irrational.

So even though the value of $z(3)$ can be approximated to any degree of accuracy through recently discovered digit-extraction algorithms, as well as rapidly converging expressions for the zeta function at $2m+1$ inspired by Ramanujan’s notebooks, obtaining a closed form solution, perhaps in terms of π, remains a supreme enigma and challenge, indeed delightful opportunity, for mathematicians.

David Stott ■

Reminders

- Please remember that make-up tests should be given in the Testing center, not the Math Lab. The Math Lab may be used in unusual circumstances when using the Testing Center is impractical for some reason, but the Math Lab is not set up to handle testing and it may create an undue burden on the Math Lab staff.

- Department policy encourages you not to use tests from the publishers’ instructor manuals. These tests are generally not sufficiently challenging, and you should design your own tests so that they reflect what you emphasized in your classroom.

- From our department handbook, “…extra credit and other kinds of bonus points should total less than 10% of the total number of regular points available.”

- Also from our department handbook, “…multiple choice questions should not account for more than 40% of the student’s grade.”

- Please do not cancel classes. If you have to miss, hire a substitute from the sublist and advise the Department Office. If you are unable to get someone from the sublist, contact the office for help.

(Continued from page 1) ***If they fall below 80%, they will be administratively withdrawn. Instructors may, at their discretion, if satisfactory justification is provided, count an absence as excused and not apply it to the calculation for determining the above penalties. Students attending 100% of the class meetings will be given 3% of the total points of the course in extra credit points.***

Now what do you think of that? Once again, I ask that you share your thoughts with me. The most convenient method of communication is by e-mail at Al.Giambrone@Sinclair.edu.

Al Giambrone ■

Sy Ostransky will be retiring at the end of Winter Quarter. He has served in the Math Lab since 1989 when it was located in Room 1343. He began working part-time in the evenings. In 1996 when the Lab moved to its current location in Room 1315, he became full-time. He and Michelle Harris have coordinated the Lab together since that time and have helped many students to be successful in their math classes.

Sy will be remembered for his extensive interest in mathematics and unique sense of humor. He put together the *Problem-Solving Handbook* to help students prepare for the AMATYC Math Competition, and conducted a number of review sessions. He also made presentations at the Department Colloquia, and contributed math problems to the Test Your Skills section in *Mathnet*. We wish him well in his future endeavors and are thankful for his many years of faithful service to the students at Sinclair.

Conference Report

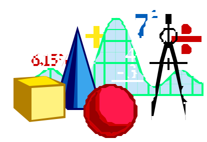
I attended the T^3 Conference (Teachers Teaching with Technology) held at Columbus State Community College on February 15-16, 2002. Three hundred twenty-five teachers attended. Most of them were secondary or pre-service personnel, and a few were college professors.

I wanted to share with you a few ideas from the conference:

1. Texas Instruments will be manufacturing the "Voyage 200" hand-held device, an upgrade to the TI-92+, slightly faster and with three times the data storage capacity. (It's due out in May or June.)

2. Graphics calculators are to be required for Ohio students in grade 6.

3. Most of the sessions dealt with teaching mathematics with technology:



- Using technology to aid concept development through real world examples
- Considerations of appropriate and inappropriate uses of technology in the classroom
- Reasons and examples for using technology

4. Interesting opinions:
- Undergraduate mathematics is rapidly becoming a laboratory discipline.
- Those teaching and learning without a calculator are at a disadvantage.

By the way, Bob Chaney gave an excellent presentation entitled: "Classroom Activities Using the CBL 2's Digital Output."

Harvey Chew ■

Harvey's Joke Corner

Ratio of an igloo's circumference to its diameter: Eskimo Pi

Shortest distance between two jokes: a straight line

1 Kilogram of falling figs: I Fig Newton