

Sinclair Mathnet

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FROM THE CHAIR



I believe that a person's level of achievement is a function of the goals they set for themselves or that others whom they respect set for them. And furthermore, I believe that it is an increasing function. In other words, the more that is expected the more that is achieved. Now students are no

exception to this. I think they generally respect us as teachers, and so the more we expect them to learn, the more they will learn. The better we expect them to learn it, the better they will learn it. The greater the mastery of skills we expect of them, the better they will master those skills. Having said all this, I must make the following qualifications:

1. A person's level of achievement is a function of more than one variable. Certainly there is a host of other factors that will affect a person's level of achievement beside the expectations that are set.
2. The function is not increasing over its entire domain. If the expectations are unreasonably high, people will become discouraged of ever achieving them, and the achievement will start to decrease.

At the risk of stretching the analogy, but to be precise, what I am suggesting is that the partial derivative of the achievement function with respect to expectation level is positive over a goodly portion of its domain. In other words, all other things being equal, the more we expect of our students, the more they will produce, as long as we don't expect an unreasonable amount, an amount that is unattainable.

I believe this for three reasons:

1. I have experienced it myself. When I set a goal for myself, or someone sets one for me, I work very hard to achieve it. When I achieve it, I relax. Had the goal been higher, I would have kept working to achieve it. Occasionally I mistakenly think I have reached my goal and relax, find out subsequently that through some misunderstanding I didn't actually reach it, and then start working again to achieve it.
2. I have experienced it raising my children. They have always worked very hard to satisfy the

expectations they know I have for them, and they usually succeed. But not always. I quickly noticed that if I said to be home by midnight, I could usually expect them by 12:15. But if I said to be home by 11:45, they seemed to be able to find a way to make it by midnight.

3. I have observed it in ten years worth of data on departmental final exam results. Those instructors with the lower leniency indices consistently have the students with the highest common final exam results.

Now the problem arises when students do not reach our expectations. This happens frequently. The reason this is a problem is because we must then decide if the expectations are unreasonable and should therefore be lowered. If one mistakenly lowers what are actually reasonable expectations, then the result is an unnecessary lowering of achievement. This is because in this region of the domain (the region where expectation is reasonable) the function is increasing, and so a decrease in the independent variable (expectation) will result in a decrease in the dependent variable (achievement).

This is an easy mistake to make in education. Our classes fall short of our expectations, so we lower our expectations by shortening our test or replacing a hard question with an easier one. We remove some material from the syllabus, give a shorter homework assignment or relax our attendance requirements. Our students tell us that their last instructor allowed formula sheets or let them finish their tests in the hallway when class was over, so we ease up a bit. After the novelty of the change wears off, our students fall equally short of our lower expectations. It is a slippery slope that leads to intellectual poverty.

I believe we must be careful to set our expectations based on what is reasonable and what is necessary for success in subsequent courses and other endeavors. We must be careful not to set our expectations on what is actually achieved for this will all too often be less than what is expected and lower expectations may result in lower achievement.

Al Giambrone ■



Faculty Feature



Annette Bragg poses with Al Giambrone and her award at the Spring Quarter Department Colloquium.

This year's recipient of the Part-time Faculty Member of the Year Award is Annette Bragg, who was presented with a certificate and a gift basket at the department colloquium on May 5.

This is Annette's tenth year as part-time faculty member for the Mathematics Department at Sinclair. Her first quarter at Sinclair was the spring quarter of 1991, when she taught Math 116, College Algebra and Math 122, Statistics I. More recently, she has been teaching College Algebra with a graphing calculator, and Math 102, Intermediate Algebra. When asked what class she has most enjoyed teaching, she said, "I like teaching them all, but College Algebra with the graphing calculator is neat because it gives them a visual way of learning; you just see the lights go on."

Annette received a Bachelor of Science degree from Taylor University in Upland, Indiana, and a Master of Education degree from Wright State University.

Annette and her husband first moved to the Dayton area in 1986 to teach for Dayton Christian Schools, where her husband Dan still works as a high school principal at their newest campus in Troy. After starting a family, Annette decided to return to work, teaching at Sinclair in the evenings. "When our first son

was one, I decided I would enjoy sharing my love for math and teaching a few hours a week. Sinclair provided the perfect opportunity for me to remain in the home during the majority of my time and yet have a 'math outlet'." Annette and her husband have four sons. Josh is in third grade and Isaiah in second grade, both at Troy Christian Elementary School. Noah, 5, and Micah, 4, are still at home.

Annette has many interests and hobbies that she enjoys in her spare time, "That is, when I'm not doing loads of laundry!" she says. Annette enjoys scrapbooking, stamping, sewing, and gardening. She teaches a weekly women's Bible studies class at her church. This year she had an opportunity to share her love of math with one of her sons and his class. "I enjoyed teaching geometry to my son's third grade class once a week - a real change from the college pace."

Please congratulate Annette on this well-deserved honor!

Susan Harris ■

Math Department Colloquium



The Spring Quarter Department Colloquium was attended by faculty and students. The speakers were Dr. Harvey Chew of Sinclair, who spoke on perfect numbers, and Dr. John Crown of AFIT, who spoke on the use of statistics in the courtroom. Pictured above is Dr. Crown during his presentation.



New Math Texts

Among the texts that have been selected for the coming year is the new edition of the Addison Wesley Longman *Basic Mathematics for Technical Calculus* by Allyn J. Washington. If you intend to teach any of the Tech Math classes (MAT 131, 132, 133), please check out the AWL web site for this text at www.technicalmath.com. It is a terrific resource for faculty and students both. Though still in its developing stages, it already has a wide variety of materials that you may find useful. Included are:

GRAPHING CALCULATOR TUTORIALS

These are tutorials for the TI - 83 calculator, nicely written with step-by-step instructions and illustrations. They cover the topics of graphing, tracing a function, creating tables for functions, programming basics, and working with matrices, among others.

MULTIPLE CHOICE QUIZZES

Chapter quizzes with questions similar to the exercises found in the text can be taken on-line. Once the quiz is taken the results are reported and the answers to the missed questions are provided.

AN ON-LINE TECH MATH COURSE

An on-line course has been prepared by the faculty of Lawrence Technological University in Michigan and is correlated to the Washington text. Each section of a chapter has a list of objectives, a reading assignment, a list of homework exercises, a review sheet, and a worksheet. The answers to the worksheets are available on-line.

The new Business Mathematics (MAT 105) text beginning this Fall Quarter is *Business Mathematics, Eighth Edition*, by Miller, Salzman, and Clendenen. It is very similar to the seventh edition, but it includes some Internet applications and activities for each chapter. These may also be referenced at the text's web site at www.mathbusiness.com. Since this is also an Addison Wesley Longman text, the web site has many useful resources for students and instructors:

STUDENT RESOURCES

Students can download tutorial software for free, and they may also easily access the web applications and activities referenced in the text.

INSTRUCTOR RESOURCES

Instructors can access resources for each chapter, including, among other things, PowerPoint slides, tables, and forms. Tables for students to use on exams will continue to be available in the Math Department Office.

The Math Lab will continue to provide tutorial software, which covers each chapter and section in the text, as well as documentary-style videos, entitled *By the Numbers*, which further explore and expound upon the topics covered in the text.



Instructors who will be teaching Technical Mathematics I (MAT 131), Business Mathematics (MAT 105), or Math in the Modern World (MAT 108) this Fall Quarter need to obtain an updated syllabus from the Math Department Office. Technical Mathematics II and III (MAT 132 and MAT 133) will have updated syllabi for Winter and Spring Quarter respectively.

IMPORTANT!

ADDISON WESLEY LONGMAN MATH TUTOR CENTER

Students who purchase a new AWL text will have access to The Addison Wesley Longman Tutor Center. This center provides free tutoring from qualified mathematics instructors via phone, fax, or e-mail.

The text will come bundled with a six-month free subscription registration number for Addison Wesley's Math Tutor Center, where students can receive tutoring on examples, related exercises, and problems contained in the text. It is open Sunday through Thursday 4:00 PM to 11:00 PM. Students with a used text can purchase a registration number through the bookstore.



Composite Structures

Dr. Achintya Mukhopadhyay recently published a very impressive article in the Journal of Composite Materials (coauthored with Robert L. Sierakowski of Department of Civil and Environmental of Engineering and Geodetic Science at OSU). The title of the article is "On Thermoelastic and Hygrometric Response of Sandwich Beams with Laminate Facings and Honeycomb Cores: Part IV - A Dynamic Theory." We asked Dr. Mukhopadhyay to give us a description of his paper in layman's terms, and to tell us about his background and his involvement in this research. Here is his response.

COMPOSITES

My academic background is primarily in the applied sciences. Both my doctoral and masters dissertations and thesis work from the University of Delaware in Mechanical and Aerospace Engineering involved research in the area of composites. Since I am basically an academic type, my interest in sandwich structures is a natural extension of my past background and experience in the area of composites. A lot of work has yet to be done.

The paper published in the Journal of Composite Materials concerns a type of composite structure called a sandwich beam. A composite is a substance composed of more than one component material. The component materials may be metals or non-metals. In the present context the component materials are non-metals, e.g., resins, fibers (carbon , glass), particulates, etc. Two-component composites are widely used in industry. A typical two-component composite is shown below.

Resins are relatively weaker in strength than fibers. In fact, the tensile strength of carbon fibers is close to the

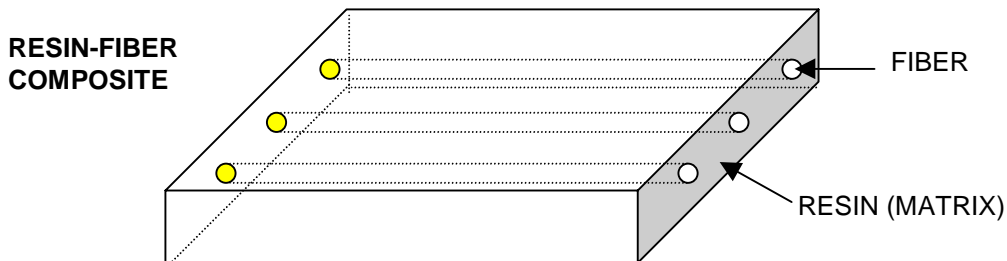
traditional material steel. The fibers are embedded in a resin matrix as shown in the figure. The orientation of the fibers can be controlled during the fabrication process. The freedom to choose the direction of the fibers when maximum strength is desired makes this kind of composite a very attractive candidate for engineering design.

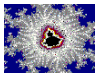
In addition, composites are relatively cheap and light weight. High strength and light weight are well known to be the primary design criteria in engineering. Consequently, composites are gradually occupying a rightful place in manufacturing industry. The greatest disadvantage of composites is the fabrication of parts of complicated shape. The manufacturing process has yet to be perfected and streamlined, so production costs can be very high. (Remember the stealth bomber!! It cost about half a billion dollars per copy!!)

The simplest type of sandwich consists of two thin, stiff, strong sheets of dense material separated by a thick layer of low density material that may be less stiff and strong. As a crude guide to the proportions, an efficient sandwich is obtained when the weight of the core is roughly equal to the combined weight of the faces. Obviously the bending stiffness of this arrangement is very much greater than that of a single solid plate of the same total weight made of the same material as the faces.

Relative Stiffness	100	700	3700
Relative Strength	100	350	925
Relative Weight	100	103	106

This structured property is justly utilized in the design of aircraft and spacecraft structures where weight and strength are the predominant design criteria. Additional weight reduction is possible if facings are chosen to be of composite material without sacrificing the strength requirements. Not only that, but by choosing the right



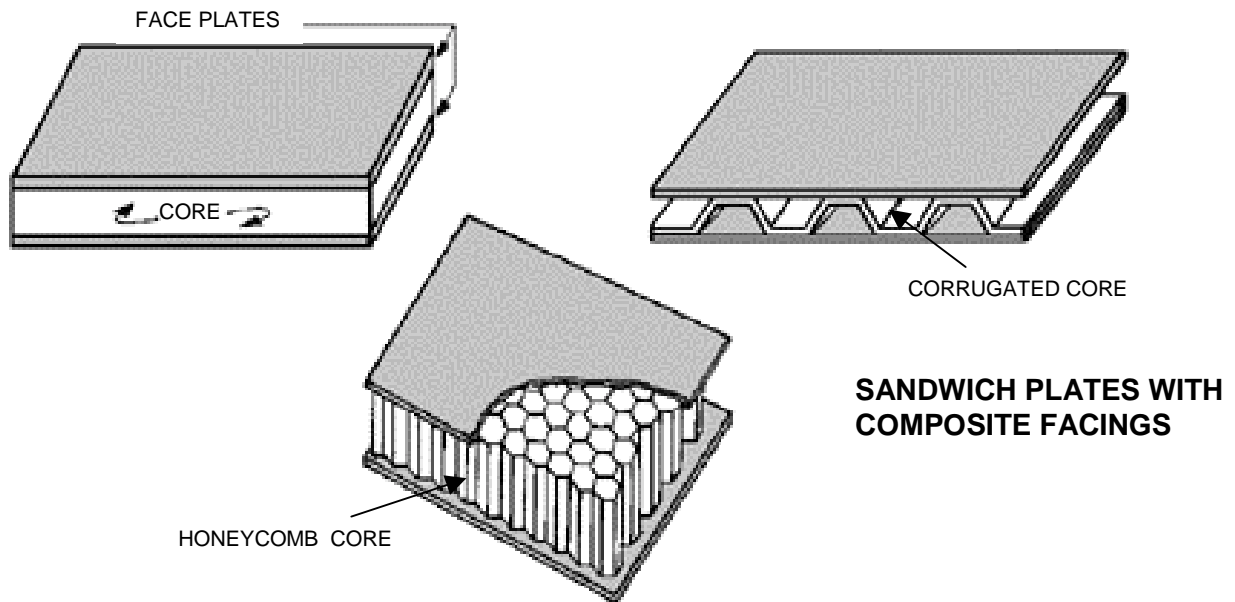


orientation of fibers, the combination may even exceed the desired strength. Typical sandwich plates, including one with layered composite facing and honeycombed core, are shown below.

A plate is a two-dimensional extension of a beam, therefore it is natural to consider the beam problem first. In my paper, a dynamic theory is proposed for a

sandwich beam with composite facings and honeycomb core in which, along with elastic deformation, the thermal and hygrometric (moisture) deformations are also included. Considering energy methods and using variational principles, the governing dynamical equations are obtained in the most general form. Applications of the theory to a specific problem and its experimental verification have yet to be done.

Achintya K. Mukhopadhyay ■



Who Said Math Isn't Rewarding?

Bloomsbury Publishing (USA) and Faber and Faber (UK) have announced that they are offering a one million dollar prize to any person who can prove Goldbach's Conjecture (that every even number greater than two is the sum of two primes) within the next two years. The prize is being offered to help promote the book *Uncle Petros and Goldbach's Conjecture*, by Apostolos Doxiadis.

Goldbach's Conjecture is one of those simple statements in mathematics that apparently seems to be true, but that defies all attempts to prove it. It is believed by some to be one example illustrating Goedel's Incompleteness Theorem, i.e., that it is a statement that is true, but is not derivable from the axioms of arithmetic. (Sy Ostransky has discovered a "proof" of Goldbach's Conjecture, but regrettably it is too long to fit into this article.)

[Parts of this article were reprinted with permission of *FOCUS*, the newsletter of the Mathematical Association of America (Incorporated).]

Just Thinking

I hope you find this quiz thoughtful.

1. Name the five wealthiest people in the world.
2. Name the last five Heisman trophy winners.
3. Name the last five winners of the Miss America contest.
4. Name ten people who have won the Pulitzer Prize.
5. Name the last six Academy Award winners for best actor and actress.
6. Name the last decade's worth of World Series winners.



How did you do?

The point is that none of us remember the headlines of yesterday. These are no second-rate achievers; they are the best in their fields. But the applause dies, awards tarnish, achievements are forgotten. Accolades and certificates are buried with their owners.



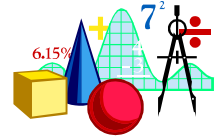
Math Department Luncheon



Tony Ponder and Tom Wilson pause for a quick shot during the Math Department Spring Lunch. The event was attended by faculty, staff, and Math Club members. The Lunch did not slow down the Math Club students, however, who were engaged in working the math problems that were at hand.

Test Your Skills

We hope you have time to investigate these problems, and to offer your solutions to either Lyn Keeler or David Stott.



1. Show that for angles a and b,

$$\frac{\sin a + \sin b}{\sin a - \sin b} = \frac{\tan\left(\frac{a+b}{2}\right)}{\tan\left(\frac{a-b}{2}\right)}$$

- Sy Ostransky

2. If S is a set containing three or more integers, then there must be two integers in S whose sum is divisible by 2. For example, if $S = \{2, 11, 17\}$, then $11 + 17$ is divisible by 2.

What is the smallest positive integer n such that if S is a set containing n or more integers, then there must be three integers in S whose sum is divisible by 3?

Just Thinking Some More

Here's another quiz. See how you do on this one.

1. List a few teachers who aided your journey through school.
2. Name three friends who have helped you through a difficult time.
3. Name five people who have taught you something worthwhile.
4. Think of a few people who have made you feel appreciated and special.
5. Think of five people you enjoy spending time with.
6. Name half a dozen heroes whose stories have inspired you.

Easier? The lesson?

The people who make a difference in your life are not the ones with the most credentials, the most money, or the most awards. They are the ones who care.

John Pfetzing ■

Harvey's Cartoon Corner

I LIED. I'M NOT OLD ENOUGH. XX

YOU DOUBLE CROSSER. XXI

COME UP AND SEE ME SOMETIME. GIRL 1 CENT

THANKS! YOU MAKE ME FEEL LIKE 2 CENTS. BOY 1 CENT

IT'S LONELY BEING THE ONLY EVEN PRIME. 2

I THOUGHT I WAS THE LONELIEST NUMBER. 1 + 1

