

# *Vision - Potential*

Vision Within Every Instructor - Potential Within Every Student

Newsletter of the HBCU College Algebra Reform Consortium\*  
Number 44, November 2002

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## [1] 7<sup>th</sup> Annual Retreat

The Seventh Annual Retreat for faculty teaching the Contemporary College Algebra program was held at Huston-Tillotson College in Austin, TX, October 10-12, 2002. Local arrangements and coordination were superbly handled by Dorothy Hunter, ably assisted by Maryam Fatehi. Also participating from Huston-Tillotson were Dr. Tran, Dr. Kamalvand, and General Marshall (ret.) who opened the program with the traditional reading of the *Hymn of Promise*. Traveling the furthest were three faculty members from Tribal Colleges in Montana: Russ Lundgren

\* Supported by the National Science Foundation and the U.S. Military Academy.

(Chief Dull Knife College), Grace Wood (Ft. Peck College) and Bob Johnke (Stone Child College). In addition to the Huston-Tillotson faculty, the in-staters included: Sarah Bush (Wiley College), Laurette and Vera King (Prairie View A & M University), Victor Obot (Texas Southern University), and Joel Williams and Bill Echols (Houston Community College System). The East coast was well represented with Elizabeth Suco and Paul Dirks (Miami-Dade CC, FL), Alex Fluellen (Clark Atlanta University, GA), Evangeline Noble (Benedict College, SC), Sita Ramamurti and Laurie Johnson (Trinity College, DC), Mary Beth Cole (College of St. Rose, NY), and Don Small (U.S. Military Academy, NY).

The program began Thursday evening with a pizza supper, followed by General Marshall reading the *Hymn of Promise* and words of welcome from Dr. Judith Loreda, Dean of Academic Affairs, and Dr. Muchere Russ, Chair of the Science Division. Don gave an update on the activities of the national movement to improve college algebra. He also spoke of an expanded role for projects as opportunities to raise the awareness of students to national issues. The growing concern over decreasing availability of fresh water, The cost of increasing fuel efficiencies in vehicles

versus the return to the driver, the Consumer Price Index, and understanding nutrition labels were briefly presented as examples of important issues that lend themselves to small group project work.

Friday morning, Laurette Foster, Victor Obot, Dorothy Hunter, Joel Williams, Paul Dirks, and Alex Fluellen shared their insights and experiences in teaching the Contemporary College Algebra program. A calculator session led by Sarah Bush, our technology leader, finished out the morning program. In the afternoon Gloria White, Director of the Eisenhower Mathematics and Science Grant Program for the Texas Higher Education Coordinating Board, spoke on “How the Coordinating Board Views The Role of College Algebra.” Following her talk, Professor Carla Seigle (Huston-Tillotson College) gave a very informative discussion of the Consumer Price Index - what it is, how it is used, and the difficulties of keeping it current. In answer to a question on what she would like students to bring to her class from their college algebra, she said the ability to plot and interpret plots and the ability to translate an equation into an English sentence.

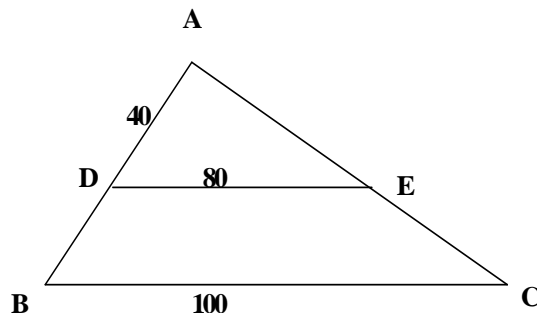
Laurette Foster discussed assessment, noting that traditional assessment measures were not suitable for the Contemporary program as it was not a “skills and drill” course. She illustrated her points with examples from her own course and then suggested each one share his/her tests with the others electronically. The afternoon session concluded with a session in a computer lab with the participants reviewing a beta version of a CD that is being developed for the Contemporary program. Dinner was at the Alborz Per-

sian Cuisine, an excellent recommendation by Maryam Fatehi.

A problem session with problems drawn from the workplace dominated the first part of Saturday morning. The second part consisted of an open discussion followed by Bill Echol’s comments on the evaluation of the Contemporary program that he has been conducting as the “outside evaluator.” Lunch and individual thanks to Dorothy concluded the Retreat program.

### [2] Small Group Activity - Similar Triangles

Given the following triangle with side DE parallel to side BC and lengths in centimeters, what is the length of the segment DB?



### [3] Essay Topic: The Uniqueness Property of Functions

Ask each of your classmates to give you their name, weight, height, and shoe size. Display this data in a four column table, listing names in the first column, corresponding weight, height, and shoe size in columns two, three, and four respectively. We would agree

(or would we?) that the table defines a function mapping a person's name into the ordered triple representing the person's weight, height, shoe size. (Explain why this is a function.) Do the two columns representing weight and height define a function? (That is, is weight a function of height or is height a function of weight?) Explain. Is shoe size a function of height? Explain. Is shoe size a function of (person's) name? Explain.

The previous paragraph suggests there are several relations included in the data, but not all of them are functions. Write a one page essay discussing:

- What property(s) a relation must have in order to be a function.
- Why we study the special class of relations called functions rather than the broader class of relations.

Attention is called to the fascinating article *Functioning Meaningfully* by Rheta Rubenstein and Randy Schwarts in the November 2002 issue of *Math Horizons* published by the MAA.

#### [4] Pythagorean Theorem

(The problems in this article were obtained from the talk given by John Hornby, University of New Orleans, at the 2002 ICTCM meeting entitled "Using Graphing Calculators to Solve Problems from the History of mathematics.")

Although mathematics historians believe that Pythagoras lived in the fifth century BC,

problems illustrating the Pythagorean Theorem existed long before then. Moreover these problems occurred across the known world. Here are a few examples:

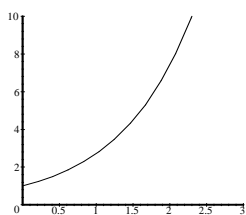
- A reed stands against a wall. If it moves down 9 feet (at the top), the (lower) end slides away 27 feet. How long is the reed? How high is the wall? (Babylonia, 1600-1300 BC)
- A bamboo shoot has a break near the top. The configuration of the main shoot and its broken portion forms a triangle. The top touches the ground 3 feet from the stem. What is the length of the stem left standing erect? (China, 300 BC)
- An erect (vertical) pole of 30 feet has its base moved out 18 feet. Determine the new height and the distance the top of the pole is lowered. (Egypt, 300 BC)
- A spear 20 feet long rests against a tower. If its end is moved out 12 feet, how far up the tower does the spear reach? (Italy, AD 1300)

#### [5] Shifting and Scaling

The text *Contemporary College Algebra: Data, Functions, Modeling*, 4<sup>th</sup> edition, by Don Small, (McGraw-Hill Publishing Co.) identifies the five most important categories of functions as: power function, radical function (inverse of power function), exponential function, logarithmic function (inverse of exponential function), and periodic functions

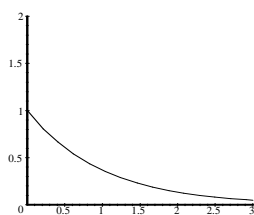
(sine and cosine). Almost all functions encountered in college algebra can be obtained by shifting, scaling, and combining representative functions from these five categories. The following sequence of plots illustrates how one can obtain the plot of  $f(x) = 2 - e^{-x}$  by shifting and scaling the basic exponential function  $g(x) = e^x$ .

Basic Function



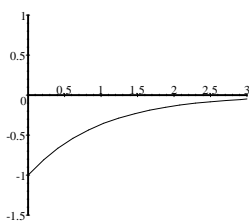
$$g1(x) = e^x$$

Scale:  $g2(x) = g1(-x)$

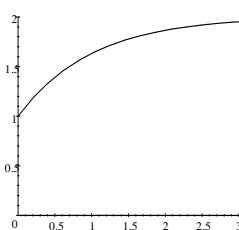


$$g2(x) = e^{-x}$$

Scale:  $g3(x) = -g2(x)$  Shift:  $g4(x) = g3(x) + 2$



$$g3(x) = -e^{-x}$$



$$g4(x) = 2 - e^{-x}$$

Develop a sequence of plots illustrating how to obtain the plot of

- $f(x) = -3(x - 2)^2 + 4$  by shifting and scaling  $g1(x) = x^2$ .
- $f(x) = 4 \sin(2x + 3) - 2$  by shifting and scaling  $g1(x) = \sin(x)$ .

## [6] Notices

1. Laurette Foster, Russ Lundgren, and Don Small will participate in the 28th Annual Conference of the American Mathematical Association of Two-Year Colleges that will be held in Phoenix, AZ, November 14-17, 2002.
2. The Contemporary College Algebra program will be well represented at the Joint Mathematics Meetings that will be held in Baltimore, MD, January 8-11, 2003. Sarah Bush and Dorothy Hunter will conduct a Poster Session on "First Year Courses;" Alex Fluellen will speak on the panel "Reflections on the Conference to Improve College Algebra;" Paul Dirks and Laurette Foster will speak on the panel "Small Group Projects in College Algebra." As members of CRAFTY, Laurette Foster and Don Small will be deeply engaged in developing MAA policy towards refocusing college algebra on data, functions, and modeling.
3. Deadline for contributions to the January Newsletter is Monday, January 6, 2003. Opinion articles, suggestions for writing assignments, small group in-class activities, small group out-of-class projects, Queries, announcements, etc. are welcomed.
4. To subscribe to this Newsletter, write to Dr. Della Bell, Chair, Department of Mathematics, Texas Southern University, 3100 Cleburne St., Houston, TX 77004.