Vision - Potential

Vision Within Every Instructor – Potential Within Every Student

Newsletter of the HBCU College Algebra Reform Consortium
Number 4 , February 1997

Contents

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[1] Thanks to Exxon

Mr. Bob Witte, Program Officer for the Exxon Educational Foundation, informed Dr. Della Bell that the Exxon Foundation would extend its funding of the HBCU College Algebra Reform Project from April 1997 through March 1998. Last fall, the Exxon foundation provided the funds to permit us to begin our Project. The extension of the funding underscores the Foundation's concern for undergraduate mathematics education and Mr. Witte's belief that our Project will make a significant contribution to reforming undergraduate curriculum. We are gratefull for the Exxon Educational Foundation financial support and for the confidence Mr. Witte has shown in our Program.

* Financial support is provided by the EXXON Educational Foundation.

[2] The HBCU College Algebra Reform Consortium Local Coordinators Meeting

Della Bell
Texas Southern University

The HBCU College Algebra Reform Consortium Local Coordinators' Meeting was held Friday, January 10, 1997 in the Solana Room, Marriott Hotel, San Diego, California. The meeting was held in conjunction with the Annual Meeting of the Mathematical Association of America. Individuals present included Lawrence Woodard, Grambling State University; Jackie Giles and Joel Williams, Houston Community College Central Campus; William Echols, Houston Community College, Northwest Campus; General Marshall, Huston-Tillotson College; N. Nagarajan, Paul Quinn College, Laurette Foster and Tommie Hill-Natter, Prairie View A & M University; Della Bell and James Ginn, Texas Southern University; Sarah Bush, Wiley College; and Don Small, U.S. Military Academy. Mr. Bob Witte, Senior Program Officer of the Exxon

Education Foundation, Irving, Texas also attended a portion of the meeting.

Agenda items for the meeting included the following: (1) discussion of what the HBCU College Algebra Reform Consortium is about – our vision, needs, problems, etc.; (2) discussion of possible student involvement activities for the students at the Consortium schools; (3) comments from Mr. Bob Witte; (4) report from the Project Evaluator, Bill Echols, concerning results from the survey administered at the HBCU College Algebra Reform Consortium Retreat held in Marshall, Texas last Fall; (5) reports from the Local Coodinators on algebra reform activities implemented during the Fall Semester, 1996; and (6) plans for 1997 including a Spring writing workshop.

The Local Coordinators reported a variety of activities undertaken in the "spirit" of algebra reform, including the use of technology, small group projects, in-class activities, writing assignments, and activities related to the development of the proposed textbook.

While at the MAA meeting, Local Coordinators participated in other activities including a minicourse on the History of Mathematics, The Calculus Reform Workshop Reunion, activities of the National Association of Mathematicians (NAM), other scheduled sessions, and viewing the exhibits. President Hicks, Grambling State University, and Della Bell were panelists on the panel "College Algebra Reform" moderated by Don Small. The NAM panel "Calculus Reform" moderated by Jackie Giles included panelists: Della Bell, Lawrence Woodard, and Don Small.

The second Retreat of the HBCU College Algebra Reform Consortium will be held in the Fall (October 2-4, 1997 ?). The focus of this Retreat will be "The use of Interdisciplinary Lively Application Projects (ILAPs) in the College Algebra Reform Movement."

[3] "Ramp Up"

(This is a small group activity that concerns a real life situation. Students will need to pay attention to dimensions and convert feet into inches or inches into feet.)

Challenging design problems are often involved in providing for a handicap ramp in a limited space. Building codes require one inch or less change in height for one foot change in horizontal distance. The Cornwall church wants to install a handicap ramp. Space is a problem, however, as there is a parking lot on one side of the church, a driveway on the other side, and a driveway across the front that enters into the parking lot. Because the driveway can not be moved, the only location for a handicap ramp is along the front of the church from the center door toward the parking lot and then possibly along the parking lot edge of the church.The church door is 14 feet from the edge of the parking lot.

Your task is to design a wheel chair ramp satisfying the building code for the Cornwall church for each of the following scenarios. Your design should include a carefully drawn sketch that shows the change in height, the length of the horizontal distance, and the length and width of the ramp. Clearly explain your reasoning and show your computations. In particular, be very clear in your description of the turn in the ramp in scenarios 2 and 3. If the ramp is "L" shaped, is there a level landing at the turn? If the ramp makes a "sweeping" turn, is the ramp surface banked? How?

1. Design a straight ramp to be installed along the front of the church, how far into the parking lot would it extend? Assume that the parking lot is level and its surface is 20 inches below the doorstep of the front door.

2. Design a ramp that runs from the front door, along the front of the church, turns and runs along the edge of the church. Assume that the parking lot is level and its surface is 20 inches below the doorstep of the front door.

3. Design a ramp that runs from the front door, along the front of the church, turns and runs along the edge of the church. Assume that the parking lot slopes downward from the front of the church. At the front corner, the surface of the parking lot is 20 inches below the front door step. The parking lot stretches 100 feet along the side of the church and at the back edge the surface level is 4 feet below the front door step.

[4] TI Offers Technological Support

William Echols
Houston Community College System
Northwest College

Texas Instruments (TI) has altered the way institutions apply for complimentary materials for teaching mathematics. The department head of mathematics is now the one that they ask to make requests. Department Heads are asked to fill out a form indicating the projected number of courses, sections, in which calculators are recommended, enrollment, and expected number of calculator purchases. On the basis of this projection, your department can receive 1 per 30 student purchases (TI-80, 81, 82, 83, 85 calculators, PCV-81 Emulation Software, Mac-81 Emulation Software, TI-GRAPHLINK, Calculator carrying case); 1 per 60 purchases (Calculator Based Laboratory (CBL) System, TI-80/TI-81/TI-82/TI-83 ViewScreen Panel, TI-85 View Screen Panel, TI-92 ViewScreen Panel, TI-92 ViewScreen Calculator); 1 per 90 student purchases (TI-80, 81, 82, 83, 85 ViewScreen Package); 1 per 45 student purchases (TI-80, 81, 82, 83, 85 ViewScreen Calculators; 1 per 120 student purchases (TI-92 ViewScreen Package).

Requests should be based on the number of TI graphing calculators (any model) you estimate students will buy and sent to the following address.

Texas Instruments
Attn: Volume Purchasing Program
Post Office Box 6118
Temple, TX 76503

You may write TI a letter to establish a dialogue for obtaining their products. Contact me for additional information or questions (Mr. William Echols, Attn: Volume Purchasing Program, 7102 Brockington Drive, Katy, TX 77494; phone 713-718-5734)

All materials will be donated on the basis of a projected number of students that purchase TI products. TI programmable calculators are user friendly and may be recommended or required in College Algebra or Calculus courses. Programmable calculators and computer algebra systems like Derive, Math T/L, Maple, Mathematica, Theorists, MathCad, and MatLab are used in many mathematics across the country to aid students in taking a more active roll in their own learning process.

[5] When was Noah Born?

(This is a small group activity that requires students to first state assumptions (e.g., the length of a gereration) and then solve the problem based on their assumptions. Different groups will probably make different assumptions and thus arrive at different results. In the ensuing class discussion, groups should be encouraged to state and defend their assumptions.)

The first chapter of the Gospel according to Matthew traces the genealogy from Abraham to Christ. Chapter 1, verse 17 of the King James Version (Nelson) states "So all the generations from Abraham to David are fourteen generations; and from David to the carrying away into Babylon are fourteen generations; and from the carrying away into Babylon unto Christ are fourteen generations." Genesis 11:10-26 lists Abram (later renamed Abraham) to be in the tenth generation descendent of Noah.

Based on this biblical information, determine an approximate date for Noah's birth. Clearly state

your assumptions and your reasoning for your assumptions. List some unknown factors that could cast doubt on your conclusion.

[6] Writing Assignment – Slope

The idea of approximating the graph of a function with a short segment of a line (tangent line) is fundamental to mathematics. Two examples: (1) The Linear Approximation Theorem, which underlies most of calculus, is merely the expression of a function in terms of a tangent line and the resulting error. (2) Most numerical solution techniques of differential equations depend on approximating the graph of a function by a tangent line (Euler Method).

The importance of understanding the *point-slope* formulation of a line cannot be overstated. (Because two points uniquely determine a slope, the "two point" formulation reduces to the point-slope formulation.) This understanding is critical to any study involving a rate of change.

Write a one page essay describing the use of slope in five different situations.

Suggestions: How does an architect use slope in designing a ramp (handicap, boat)? How does a roofer use slope in describing a roof? How does a road engineer use slope in describing a hill?

[7] Can the Inside be larger than the Outside?

(This is a small group in-class, fun activity. Students need to explore relationships among the first few terms of two sequences, define the two sequences, and then analyze the results.)

Consider a sequence of triangular arrangements of tennis balls (or M&M's). The first few terms of the sequence are pictured below

The balls on the outside of the triangular patterns are called "exterior" and all the rest are called "interior."

Consider the sequences of the number of exterior balls and interior balls. That is,

exterior points: 1, 3, 6, 9, 12, 15,. . . .
interior points is 0, 0, 0, 1, 3, 6, ...

Determine:

a. A formula for the number of balls in the n^{th} triangular pattern.

b. A formula for the n^{th} term in the sequence of number of exterior balls.

c. A formula for the n^{th} term in the sequence of number of interior balls.

d. Will the number of interior balls will ever be greater than the number of exterior balls in the same pattern? If so, determine the first triangular pattern for which this is true. Otherwise, explain why the number of interior balls can never exceed the number of exterior balls.

[8] Notes

1. The Deadline for contributions to our March Newsletter is

   Wednesday, March 12, 1997.

   Opinion articles, suggestions for writing assignments, small group in-class activities, small group out of class projects, Quick Questions, CBL activities, announcements, etc. are all welcomed. Please send material to Della Bell, Dept. of Mathematics, Texas Southern University, 3100 Cleburne St., Houston, TX 77004.

2. Please post the enclosed list of this summer's Calculus Reform Workshops. All participant expenses, except for personal travel, are paid by the National Science Foundation.