national association of mathematicians

Summer Issue Newsletter
2004
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IN THE NEWS

3x+1 correction: In the Spring issue 35.1, the editor announced a famous question called the 3x+1 problem had been solved by Charles Cadogan. In a rush to meet deadlines, we included a sketch of Cadogan's proof which included at least one error. Subsequent to publication, the editor of this newsletter found a hole in Cadogan's proof. This Editor's question has been checked by others, and subsequent contact with Cadogan has not changed our opinion. Thus, the has been no solution to my knowledge.

CAARMS 10: Mathematical Sciences Research Institute and the Lawrence Berkeley National Laboratory hosted CAARMS 10 June 22-25. The first CAARMS was held at the Mathematical Sciences Research Institute in 1995. It marked a significant opportunity for minority mathematicians and potential mathematicians. In additional lectures by professional mathematicians, significant component of CAARMS has been graduate student poster sessions. Many students have received support for travel, and many of these students have later received a Ph.D. in Mathematics. This years, CAARMS scheduled lectures by Craig Sutton of the University of Pennsylvania, Rachel Vincent of Rice University, Kimberly Sellers of Carnegie Mellon University, Robert Hampshire of Princeton University, Sean Brooks of Howard University, Juan Gilbert of Auburn University, Stephon Alexander of Stanford Linear Accelerator Center, Gerard Awanou of Institute for Mathematics and its Applications, Douglas McWilliams of North Carolina A&T University/ and Purdue University, Monica Jackson of Emory University, Donald Williams of Rice University, and Milton Nash of University of Georgia. For more details see http://www.princeton.edu/~wmassey/CAARMS10/

DAVID BLACKWELL LECTURE. The MAA's Annual Summer Meeting Providence, RI August 12-14 will feature the NAM-MAA David Blackwell Lecture. This year the lecture will be given by Dr. Dawn Alisha Lott of Delaware State University. Friday, August 13, 8:30 am - 9:20 am. Title: Mathematical Predictions and Aneurysm Treatment

Abstract. Effective modeling of flow for cerebral aneurysms and their parent arteries depend on the input flow, the size of the parent vessel and aneurysm and other numerous factors. Two-dimensional models seem to lack the necessary power to reproduce accurate flow events within in vivo aneurysms. In addition, little is written describing the role of the neck and proximal dome configuration in establishing areas of shear stress as a potential for aneurysm growth. Using finite volume analysis, we develop two and three dimensional saccular aneurysm models and assess flow characteristics as compared to a recently published in vitro three-dimensional model. Different neck and dome configurations with regards to shear stress, velocity and pressure are compared. Emphasis is on optimal methods of treatment predicted by mathematical analysis.

Top 10 Beautiful Experiments Ranked

At noon on the summer solstice in the Egyptian town now called Aswan, the sun hovers straight overhead: objects cast no shadow and sunlight falls directly down a deep well. When he read this fact, Eratosthenes, the librarian at Alexandria in the third century B.C., realized he had the information he needed to estimate the circumference of the planet. On the same day and time, he measured shadows in Alexandria, finding that the solar rays there had a bit of a slant, deviating from the vertical by about seven degrees.

The rest was just geometry. Assuming the earth is spherical, its circumference spans 360 degrees. So if the two cities are seven degrees apart, that would constitute seven-360ths of the full circle -- about one-fiftieth. Estimating from travel time that the towns were 5,000 "stadia" apart, Eratosthenes concluded that the earth must be 50 times that size -- 250,000 stadia in girth. Scholars differ over the length of a Greek stadium, so it is impossible to know just how accurate he was. But by some reckonings, he was off by only about 5 percent. Thus we have **Eratosthenes' measurement of the Earth's circumference (Ranking: 7).**

A group of physicists were asked to rank the most beautiful experiments. Below is the list as appeared in Physics World and a discussion of each item.

1 Young's double-slit experiment applied to the interference of single electrons
2 Galileo's experiment on falling bodies (1600s)
3 Millikan's oil-drop experiment (1910s)
4 Newton's decomposition of sunlight with a prism (1665-1666)
5 Young's light-interference experiment (1801)
6 Cavendish's torsion-bar experiment (1798)
7 Eratosthenes' measurement of the Earth's circumference (3rd century BC)
8 Galileo's experiments with rolling balls down inclined planes (1600s)
9 Rutherford's discovery of the nucleus (1911)
10 Foucault's pendulum (1851)

Others unranked experiments that were cited:
Archimedes' experiment on hydrostatics; Roemer's observations of the speed of light; Joule's paddle-wheel heat experiments; Reynolds's pipe flow experiment; Mach & Salcher's acoustic shock wave; Michelson-Morley measurement of the null effect of the ether; Rvntgen's detection of Maxwell's displacement current; Oersted's discovery of electromagnetism; The Braggs' X-ray diffraction of salt crystals; Eddington's measurement of the bending of starlight; Stern-Gerlach demonstration of space quantization; Schrvdinger's cat thought experiment; Trinity test of nuclear chain reaction; Wu et al.'s measurement of parity violation; Goldhaber's study of neutrino helicity; Feynman dipping an O-ring in water

Ranking1: Young's double-slit experiment

Young's applied to the interference of single electrons Neither Newton nor Young was quite right about the nature of light. Though it is not simply made of particles, neither can it be described purely as a wave. In the first five years of the 20th century, Max Planck and then Albert Einstein showed, respectively, that light is emitted and absorbed in packets -- called photons. But other experiments continued to verify that light is also wavelike.

It took quantum theory, developed over the next few decades, to reconcile how both ideas could be true: photons and other subatomic particles -- electrons, protons, and so forth -- exhibit two complementary qualities; they are, as one physicist put it, "wavicles."

To explain the idea, to others and themselves, physicists often used a thought experiment, in which Young's double-slit demonstration is repeated with a beam of electrons instead of light. Obeying the laws of quantum mechanics, the stream of particles would split in two, and the smaller streams would interfere with each other, leaving the same kind of light- and dark-striped pattern as was cast by light. Particles would act like waves.

According to an accompanying article in Physics World, by the magazine's editor, Peter Rodgers, it wasn't until 1961 that someone (Claus Jonsson of Tubingen) carried out the experiment in the real world. By that time no one was really surprised by the outcome, and the report, like most, was absorbed anonymously into science.

Ranking 2: Galileo's experiment on falling objects

In the late 1500's, everyone knew that heavy objects fall faster than lighter ones. After all, Aristotle had said so. That an ancient Greek scholar still held such sway was a sign of how far science had declined during the dark ages.

Galileo Galilei, who held a chair in mathematics at the University of Pisa, was impudent enough to question the common knowledge. The story has become part of the folklore of science: he is reputed to have dropped two different weights from the town's Leaning Tower showing that they landed at the same time. His challenges to Aristotle may have cost Galileo his job, but he had demonstrated the importance of taking nature, not human authority, as the final arbiter in matters of science.

Ranking3: Millikan's oil-drop experiment

Since ancient times, scientists had studied electricity -- an intangible essence that came from the sky as lightning or could be produced simply by running a brush through your hair. In 1897 (in an experiment that could easily have made this list) the British physicist J. J. Thomson had established that electricity consisted of negatively charged particles -- electrons. It was left to the American scientist Robert Millikan, in 1909, to measure their charge.

Using a perfume atomizer, he sprayed tiny drops of oil into a transparent chamber. At the top and bottom were metal plates hooked to a battery, making one positive and the other negative. Since each droplet picked up a slight charge of static electricity as it traveled through the air, the speed of its descent could be controlled by altering the voltage on the plates. (When this electrical force matched the force of gravity, a droplet -- "like a brilliant star on a black background" -- would hover in midair.) Millikan observed one drop after another, varying the voltage and noting the effect. After many repetitions he concluded that charge could only assume certain fixed values. The smallest of these portions was none other than the charge of a single electron.

Ranking 4: Newton's decomposition of sunlight with a prism

Isaac Newton was born the year Galileo died. He graduated from Trinity College, Cambridge, in 1665, then holed up at home for a couple of years waiting out the plague. He had no trouble keeping himself occupied.

The common wisdom held that white light is the purest form (Aristotle again) and that colored light must therefore have been altered somehow. To test this hypothesis, Newton shined a beam of sunlight through a glass prism and showed that it decomposed into a spectrum cast on the wall. People already knew about rainbows, of course, but they were considered to be little more than pretty aberrations. Actually, Newton concluded, it was these colors -- red, orange, yellow, green, blue, indigo, violet and the gradations in between -- that were fundamental. What seemed simple on the surface, a beam of white light, was, if one looked deeper, beautifully complex.

Ranking5: Young's light-interference experiment

Newton wasn't always right. Through various arguments, he had moved the scientific mainstream toward the conviction that light consists exclusively of particles rather than waves. In 1803, Thomas Young, an English physician and physicist, put the idea to a test. He cut a hole in a window shutter, covered it with a thick piece of paper punctured with a tiny pinhole and used a mirror to divert the thin beam that came shining through. Then he took "a slip of a card, about one-thirtieth of an inch in breadth" and held it edgewise in the path of the beam, dividing it in two. The result was a shadow of alternating light and dark bands -- a phenomenon that could be explained if the two beams were interacting like waves.

Bright bands appeared where two crests overlapped, reinforcing each other; dark bands marked where a crest lined up with a trough, neutralizing each other. The demonstration was often repeated over the years using a card with two holes to divide the beam. These so-called double-slit experiments became the standard for determining wavelike motion -- a fact that was to become especially important a century later when quantum theory began.

Ranking6: Cavendish's torsion-bar experiment

Another of Newton's contributions was his theory of gravity, which holds that the strength of attraction between two objects increases with the square of their masses and decreases with the square of the distance between them. But how strong is gravity in the first place?

In the late 1700's an English scientist, Henry Cavendish, decided to find out. He took a six-foot wooden rod and attached small metal spheres to each end, like a dumbbell, then suspended it from a wire. Two 350-pound lead spheres placed nearby exerted just enough gravitational force to tug at the smaller balls, causing the dumbbell to move and the wire to twist. By mounting finely etched pieces of ivory on the end of each arm and in the sides of the case, he could measure the subtle displacement. To guard against the influence of air currents, the apparatus (called a torsion balance) was enclosed in a room and observed with telescopes mounted on each side.

The result was a remarkably accurate estimate of a parameter called the gravitational constant, and from that Cavendish was able to calculate the density and mass of the earth. Erastothenes had measured how far around the planet was. Cavendish had weighed it: 6.0 x 1024 kilograms, or about 13 trillion trillion pounds.

Ranking 8: Galileo's experiments with rolling balls down inclined planes

Galileo continued to refine his ideas about objects in motion. He took a board 12 cubits long and half a cubit wide (about 20 feet by 10 inches) and cut a groove, as straight and smooth as possible, down the center. He inclined the plane and rolled brass balls down it, timing their descent with a water clock -- a large vessel that emptied through a thin tube into a glass. After each run he would weigh the water that had flowed out -- his measurement of elapsed time -- and compare it with the distance the ball had traveled.

Aristotle would have predicted that the velocity of a rolling ball was constant: double its time in transit and you would double the distance it traversed. Galileo was able to show that the distance is actually proportional to the square of the time: Double it and the ball would go four times as far. The reason is that it is being constantly accelerated by gravity.

Ranking9: Rutherford's discovery of the nucleus

When Ernest Rutherford was experimenting with radioactivity at the University of Manchester in 1911, atoms were generally believed to consist of large mushy blobs of positive electrical charge with electrons embedded inside -- the "plum pudding" model. But when he and his assistants fired tiny positively charged projectiles, called alpha particles, at a thin foil of gold, they were surprised that a tiny percentage of them came bouncing back. It was as though bullets had ricocheted off Jell-O.

Rutherford calculated that actually atoms were not so mushy after all. Most of the mass must be concentrated in a tiny core, now called the nucleus, with the electrons hovering around it. With amendments from quantum theory, this image of the atom persists today.

Ranking10: Foucault's pendulum

Last year when scientists mounted a pendulum above the South Pole and watched it swing, they were replicating a celebrated demonstration performed in Paris in 1851. Using a steel wire 220 feet long, the French scientist Jean-Bernard-Leon Foucault suspended a 62-pound iron ball from the dome of the Pantheon and set it in motion, rocking back and forth. To mark its progress he attached a stylus to the ball and placed a ring of damp sand on the floor below.

The audience watched in awe as the pendulum inexplicably appeared to rotate, leaving a slightly different trace with each swing. Actually it was the floor of the Pantheon that was slowly moving, and Foucault had shown, more convincingly than ever, that the earth revolves on its axis. At the latitude of Paris, the pendulum's path would complete a full clockwise rotation every 30 hours; on the Southern Hemisphere it would rotate counterclockwise, and on the Equator it wouldn't revolve at all. At the South Pole, as the modern-day scientists confirmed, the period of rotation is 24 hours.

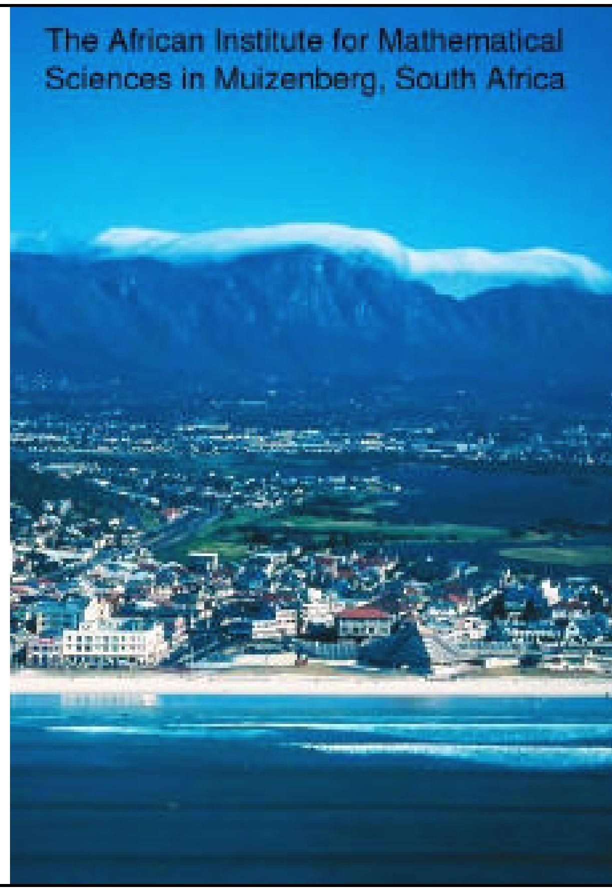
Publisher: Phsyics Today
Author: Robert P Crease is in the Department of Philosophy, State University of New York at Stony Brook, historian at the Brookhaven National Laboratory, and in 2002-2003 a senior fellow at the Dibnes Institute for Science and Technology, US, email rcrease@notes.cc.sunysb.edu

African Institute for Mathematical Sciences

The African Institute for Mathematical Sciences (AIMS) is a new educational centre in Cape Town, South Africa. The goals of AIMS are: to promote mathematics and science in Africa; to recruit and train talented students and teachers; to build capacity for African initiatives in education, research, and technology. An overview of the AIMS project may be downloaded at: http://www.aims.ac.za/english/

Support AMUCHMA

For 29 issues, the African Mathematical Union's Commission on the History of Mathematics in Af (AMUCHMA) has revealed new and interesting mathematical material to the world of history, archeology, and education. There is a call for support financially AMUCHMA’s activities and/or to suggest alternative sources of financing The newsletter is free and accessible on the websi http://www.math.buffalo.edu/mad/AMU/amuchm online.html



So You Want to be a Teacher

by Jacqueline Brannon Giles

In the two-year college, it may be that many of the teachers did not plan to be one when they were in college. Over the years, they may have been business people, engineers, social workers or in other professions. No doubt their need to connect and communicate with people is what drove them to the teaching profession. Or, as in my case, a colleague looked at my personality and attributes, and decided to encourage me to become a teacher.

Great educators were in my family: an aunt taught for more than 40 years in the Houston Independent School District; and another aunt worked at Texas Southern University for 30 years, and founded the Texas Southern University Gospel Choir for students that was lead by the outstanding musician V. Michael McKay, and had members such as Jennifer Holliday, Finnessa White and other great singers. So, I have always been aware of the role of teachers, since both aunts and my mother nurtured and directed me during my formative years.

My first teacher was my mother. She patiently played games and puzzles with me when I was a child. She corrected my speech, posture, logic and overall presentation in life, including my choice of clothing and colors. She was a role model and coach. Her opinion was readily given when I had a need, and even when I did not recognize my need. Her keen eye and steady gaze would scan me up and down, and in and out to identify that I had attained the level of excellence that she expected in all of her children.

I claim that this level of attentiveness is needed in classroom teachers. For during the 21st century we are beginning to realize that the "whole man or woman" needs to be attended to. Developing the climate for students to learn often requires the attentive heart of a mother, and the protective demeanor of a father.

Why do I say these things? Well, in the two-year college I have encountered students who were abused, misused and confused. Of course, there are those students who are gifted, healthy, focused and mature, but we can not ignore the presence of the others who, too, need to be thoroughly "taught." As students in the two-year college, they are seeking a better way, and another chance to make it in life. They are looking for news ways and new paths to reach their goals¾goals that are often unclear but certainly different from experiences in their past. We, the teachers, stand before them with a tremendous amount of influence¾in some ways, their lives are in our hands for each 50 minute period, and their view of themselves and their potential can be re-shaped, released or distorted and oppressed depending on our level of knowledge and maturity to demonstrate good teaching. Even if we did not want to be teachers during our early career, our presence in the two-year college classroom is confirmation of our "call" to be there. And, with each "call" in life is a responsibility for perpetual preparation and dedication because the students sitting before us may have never experienced the supportive, instructive, corrective and even therapy-type environment demonstrated under our tutelage.

So you want to be a teacher! Yes, because I (and you) want to do something to assist our nation remain strong and secure. Our role as a teacher is a role in the "army" at home in the United States. To fail to teach and to learn more about teaching this generation translates into failure to be an effective citizen in the United States. Our mindset should be that all students deserve a chance (and even a second or third chance) to develop into a fully functional citizen. We have to believe that even those who have experienced hardships and barriers beyond our comprehension deserve an opportunity to be taught and to be in the presence of someone who points the way to "access" and to a greater degree of functionality in society.

A conclusion is that our job is not an easy one; it is a challenging one that we do and learn to love ***to do it well***. We realize that our totality of perceptions and experiences are simply an example, and that the next generation can build on our core beliefs and extend those beliefs for their generations. Granted, each generation is dependent on the previous one, yet if taught well, will extend and improve, and move toward a more excellent way for all of mankind. If this vision is set before us, it at least directs us toward a more excellent way, even if our reality is muttered by life's tendency to drift toward entropy –a state of disorder and chaos. Nevertheless, we must aim toward the good, the just, and the excellent and learn to tap into those things that promise true excellence in this journey through time and eternity.

Note: Definition of **entropy (en·tro·py):** *n. pl.* **en·tro·pies** *Symbol* **S** For a closed thermodynamic system, a quantitative measure of the amount of thermal energy not available to do work.

1. A measure of the disorder or randomness in a closed system.
2. A measure of the loss of information in a transmitted message.
3. The tendency for all matter and energy in the universe to evolve toward a state of inert uniformity.
4. Inevitable and steady deterioration of a system or society.

reference: Dictionary.com

Jacqueline Brannon Giles is an editor of this, the NAM Newsletter.

Editor's Note: U.S. Department of Education Title V Grants are awarded to Hispanic-Serving Institutions to assist eligible Hispanic-serving institutions of higher education to expand their capacity to serve Hispanic and low-income students. Five-year development grants and one-year planning grants may be awarded.

Job Openings

Recall that for several years, NAM has had a web site with listings of open positions. This process is open to advertisers in the Newsletter. The advertisements appear there six or more weeks before they appear in the Newsletter, since November 15, 2002. Go to the editor's NAM web site within MAD: **http://www.math.buffalo.edu/mad/NAM/**

Virginia Union University

Mathematics Department Chair

QUALIFICATIONS: Ph.D. in Applied Mathematics or Mathematics Education; ABD with higher education experience considered, Minimum five years experience

RESPONSIBILITIES: Overall management and supervision of faculty and staff and program execution in Mathematics/Computer Science Department; Responsible for planning, budgeting, scheduling of classes, internal structure, assessment and utilization of space; Special consideration given to individuals who have demonstrated ability to secure external funding, to integrate advanced technologies into the curriculum, and to implement strategies for success and optimum productivity in departmental programs with emphasis on computer science

APPLICATION: Send vitae, transcripts, and three letters of reference to: Dr. Phillip W. Archer, Chair, MCS Search Committee, Virginia Union University, 1500 N. Lombardy Street, Richmond, VA 23220 Email: pwarcher@vuu.edu

Bowdoin College

Department of Mathematics.

A two-year leave replacement position starting Fall, 2004, at the Instructor or Assistant Professor level. Open to all applicants. Ph.D. preferred, ABD considered. Evidence of excellent undergraduate teaching is desirable. Normal teaching load is two courses per semester. Applications will be accepted until the position is filled. Send completed AMS application cover sheet (www.ams.org), resume, 3 letters of recommendation, and any available evidence of teaching excellence to William Barker, Chair, Department of Mathematics, Bowdoin College, 8600 College Station, Brunswick, ME 04011-8486. Include e-mail address. Bowdoin College is committed to equal opportunity through affirmative action. Women and minorities are encouraged to apply. Bowdoin College is a private, highly selective, undergraduate institution located half an hour from Portland and two hours from Boston. More information about the Department and Collegecan be found at http://www.bowdoin.edu/.

Institute for Advanced Study

School of Mathematics

The School of Mathematics has a limited number of memberships, some with financial support for research in mathematics and computer science at the Institute during the 2005-06 academic year. Candidates must have given evidence of ability in research comparable at least with that expected for the Ph.D. degree.

During the academic year 2005-06 the School will host a program on Lie groups, representations and discrete mathematics. The program will be led by Alexander Lubotzky of The Hebrew University of Jerusalem. The goal of the program is to bring together mathematicians from several areas in order to strengthen the ties between the fields and generate further collaborations.

For additional information on the program, see http://www.math.ias.edu/liegroups.html

The School of Mathematics and the Department of Mathematics at Princeton University have established the Veblen Research Instructorship, and three-year instructorships will be offered each year to candidates who have received their Ph.D. within the last 3 years. The first and third year of the instructorship will be spent at Princeton University and will carry regular teaching responsibilities. The second year will be spent at the Institute and dedicated to independent research of the instructor's choice.

Application materials for both the IAS MEMBERSHIPS and the VEBLEN RESEARCH INSTRUCTORSHIP positions may be requested from Applications, School of Mathematics, Institute for Advanced Study, Einstein Drive, Princeton, NJ 08540, e-mail: applications@math.ias.edu. Application forms may be downloaded via a web connection to http://www.math.ias.edu Both deadlines are December 1.

NAM Calendar

You can find NAM's Online Conference Calendar and the most recent links to relevant conferences announcements. at http://www.caam.rice.edu/~nated/orgs/nam/programs/conferences.html

* 29th Nov.- 2nd Dec. 2004, Southern African Mathematical Sciences Association 2004 Conference (SAMSA' 04) see http://www.math.buffalo.edu/mad/Africa-today/2004.SAMSA.html

* August 12-14 MAA MathFest, The MAA's Annual Summer Meeting Providence, RI

NAM Board, Elections and Terms

NOMINATIONS (open to members) are due for the NAM Board positions Vice-President, Region B representative, and Majority Institution representative. By August 1, 2003, please contact NAM's election supervisor Dr. Earl Barnes School of Industrial Systems Engineering; Georgia Institute of Technology; Atlanta, GA 30332-0205. Make certain the nominated individual agrees to run. Send vita data such as Name, email address, School, position, and date of last degree.

All members of the Board shall be elected to a term of office for a period of two years and elections shall be staggered for continuity. Regular elections shall occur in the fall of each year and the persons elected shall be duly installed at the first Annual NAM meeting following the election. The term of each elected position is three (3) years. The editor will be an appointed position for a period of three years. The Editor shall be responsible for the production of the Newsletter and shall perform such other duties as the Board of Directors may specify. The Executive Secretary shall be selected to serve for a period of five (5) years and shall begin the term of office at the Spring Board Meeting. His/her selection must be the unanimous choice of the existing Board of Directors.

The election of the members of the Board of Directors shall be by official ballots and shall be supervised by the Board of Director's Committee on Legislation-Nomination when the election is by mail, all current members in good standing in NAM shall be provided a ballot and given reasonable time to return it.

The election cycle is can be followed modulo 3. Year 2001 was year 2 mod 3. It is the election Representative of Region C, Community College Representative, Secretary/Treasurer.

In year 0 mod 3 Representative of Region A, Government/Industry Representative, President

In year 1 mod 3 Representative of Region B, Majority Institution Representative, Vice President.

A call for nominations will be made in the Spring Issue of the Newsletter. Nominations should be made to the Editor by August 15 of the election year.

This year's nominations are for Representative of Region B currently held by Dr. William Hawkins University of District Columbia and MAA, **Majority Institution Representative** currently held by Dr. Earl R. Barnes Georgia Institute of Technology, and **Vice President** currently held by Nathaniel Dean Texas Southern University.

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(FOR NEW APPLICATIONS AND ANNUAL MEMBERSHIP RENEWAL)

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[ ] INSTITUTIONAL : $100 [ ] LIFE : $400

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INDIVIDUALS AND STUDENTS : Please complete below if you did not send NAM this information within the past three years.

List all degrees you currently hold. Circle the correct degree.
B.S. or B.A. : Area __________________ ___ Institution __________________ ________
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