Mathematics Alumni Newsletter

UNIVERSITY OF DENVER

Winter 2009

A Note From The Chair

Math Education at DU

As our department grows (we now have 49 undergraduate and 15 graduate students enrolled) we have had the opportunity to increase our emphasis in some educational areas. In particular, I thought you might be interested in hearing about new programs that support an increased emphasis on educating math educators.

Dual Degree Program

In partnership with DU's new Morgridge College of Education, math students are now able to obtain a dual undergraduate/ graduate degree. This combines their undergraduate mathematics degree with a masters degree in Curriculum & Instruction. The dual degree structure enables students to complete the two degrees and recommendation for a teaching license in five years.

Students in this dual undergraduate/graduate teaching degree program complete their undergraduate foundation and core requirements, as well as their major and minor requirements, during their first three academic years. Application into the Dual Undergraduate/Graduate Degree Program is made during the third year. During the fourth year of study, they enroll in the Teacher Education Program (TEP), an intensive, integrated learning experience that prepares individuals for a career in education. The fifth year of study is a combination of graduate courses in education as well as any outstanding undergraduate requirements.

Enhancing Early Mathematics Learning and Assessment via Interactive Computer Games

In October, 2008, the Mathematics Department was awarded a Head Start grant for a project to design and implement developmentally appropriate computer games that support and enhance early mathematics education in the Head Start classroom and at home. Head Start is a Federal program designed to help children from birth to age five, who come from families with incomes below or at the poverty level. The goal of Head Start is to help these children become ready for kindergarten, and also to provide needed requirements like health care and food support. Games developed under this grant will be designed for children aged 3 to 5.

Children at this age learn by playing. Math learning is enhanced if it progresses from the concrete to the abstract and builds gradually on children's experiences, including their family, linguistic, cultural, and community backgrounds. Accordingly, the project is based on two novel ideas: parametrized games and the use of computer play-based assessment. On one hand, a parametrized gaming platform will allow the teacher to easily change various aspects of the game, such as the underlying language, game entities, and a myriad of other details and attributes, such as shapes, colors, movement patterns, etc., allowing the child to progress from the familiar to the unfamiliar through increasing levels of abstraction and difficulty. On the other hand, the internationally accepted play-based assessment format (developed by one of the team members) will be extended and adapted to the context of computer games, so as to allow teachers to translate observations of functional behaviors into levels of math "readiness".

The multidisciplinary team that includes researchers in early childhood education, mathematics, mathematics education, computer science, and music consists of Principal Investigator (PI) Mario Lopez from the Math Department, and co-PIs Alvaro Arias (Math Chair), Jeff Farmer (Math), Toni Linder (Morgridge College of Education), and Chris Malloy (Lamont School of Music).

Alvaro Arias

Hockey Night 2009

This year, the Math Alumni Hockey night is set for Saturday, February 28, 2009 at 7:07 and tickets are available to math alumni for the discounted prices of $5.00 for the first two tickets and $13.00 each for additional tickets. Last year we had around 100 alumni, faculty, staff, and guests. Just prior to the game, alumni pick up tickets and join us for refreshments in John Greene Hall. It's a wonderful opportunity to see old friends and make new acquaintances.

Flyers, with a form for ordering tickets, were sent to alumni in the Colorado front range for whom we have addresses. If you would like to attend the game but haven't received a flyer, please contact Don Oppliger at (303) 871-3072 or by email to dopplige@du.edu by February 20. Act now! Tickets are limited and go quickly.

Mathematical News From Around The World

Some things you might never know unless you read obscure publications or browse the Internet a lot.

From the Manchester Evening News: " 'Cool Cash' card confusion" by Clara Leeming: A temperature-related lottery in England had to be canceled when players had trouble with negative numbers. In the "Cool Cash" game, lottery players scratched windows to reveal temperatures. If the temperatures were lower than a number displayed elsewhere on the card, the player won. The game had a winter theme, and temperatures were in Celsius, so many of the numbers involved were negative, which is what caused the problem. Said lottery player Tina Farrell, "On one of my cards it said I had to find temperatures lower than -8. The numbers I uncovered were -6 and -7 so I thought I had won, and so did the woman in the shop. But when she scanned the card the machine said I hadn't. I phoned Camelot [which ran the game] and they fobbed me off with some story that -6 is higher---not lower---than -8 but I'm not having it.... Imagine how many people have been misled." Camelot withdrew the game "because of the potential for player confusion."

and… 5 feet or 0.5 feet??

From the San Jose Mercury News, "Why Math is Important" by Chuck Shepherd: The Army Corps of Engineers announced with great fanfare in June [2007] that its repairs and upgrades of levees in the Lakeview neighborhood of New Orleans, after Hurricane Katrina, would allow the system to hold back a storm's flood waters more than 5 feet beyond the Katrina level. However, in November [2007], the corps announced a mistake in calculation (an engineer had used a 'minus' sign when a 'plus' sign was called for). The expensive levee repairs would actually protect against flooding only 6 inches above the Katrina level.

Math Puzzler

The previous puzzler stated the following — A deck of playing cards is shuffled and cards are turned over, from the top, one at a time until the first ace is dealt.

The questions was then asked — "Is it more likely that the next unturned card is an ace or a two?"

It was noted that — Since an ace has appeared, it seems more likely that the next card is a two rather than an ace. Also, it is unusual for two aces to appear consecutively so again it seems more likely the next card is a two. But wait; only one of the turned cards is an ace and it's possible that two, three or four of the turned cards are twos. Now it seems more likely the next card is an ace. On the other hand, . . . , oh well, you do the math.

Solution — *We didn't receive any proposed solutions to this problem so, here's the answer...* It is equally likely that an ace or a two is the next unturned card. The probability that the next unturned card is an ace or a two is 1/13 in both instances. To show this, let's compute the probability that the next unturned card is the ace of spades. First remove the ace of spades from the deck. We now have a deck with 51 cards and there are 51! different orders of these cards. For each of these orderings replace the ace of spades directly after the first ace in this smaller deck. We see that there are 51! different orderings in which the ace of spades follows the first ace. Since there are 52! orderings of a deck, the probability that the ace of spades follows the first ace is 51!/52!=1/52. The same argument applies to the aces of clubs, diamonds and hearts so the probability that the next unturned card is an ace is 4/52=1/13. Also, the same argument applies to the next unturned card being a two.

For the next puzzler consider the following...

Suppose each point in the plane of real numbers is colored either red or blue. For example, the point (7,4) might be colored red, the point (7.5, 18.3) might also be colored red, and the point (6, e) might be colored blue, etc.

Prove that no matter what the coloring scheme, there will always exist two points at a distance one (1) from each other that are of the same color .

An extension of this problem is the case in which each point is colored with one of three colors (red, green, blue, for example). The problem is to then prove that there will still always exist two points at a distance of one (1) from each other that are of the same color.

Send your proofs for either or both problems to Sharon Bütz - sbutz@math.du.edu