

The Almagest

The bi-weekly newsletter of the Department of Mathematics and Computer Science. Your trusted source for news.

Volume 8, No. 4

October 26, 2015

Alma College
Alma, MI 48801

Math Colloquium – November 3rd

Data mining involves extracting as much information as possible from a large set of data. In this talk, **Dr. Brad Westgate**, Assistant Professor of Mathematics at Alma College, will introduce different branches of data mining, including classification and clustering. Classification refers to predicting an unknown categorical variable, using several observed variables. For example, a company might predict whether a customer will buy their product or not, using information about the customer's age, gender, and previous purchases. Clustering refers to dividing a large dataset into smaller groups. Dr. Westgate will discuss methods for classification and clustering, and show examples of these methods using real data.

“Introduction to Data Mining”

Presenter: **Dr. Brad Westgate**

Date: **Tuesday, November 3rd**

Time: 4:00

Place: SAC 113

Refreshments at 3:50



Major Field Achievement Test (MFAT)

All math and computer science majors are required to take the MFAT in their respective areas. The exams, created by the Educational Testing Service, provide students with a measure of their level of achievement within their field of study compared to students (majoring in that same area) from other colleges and universities. In addition, academic departments use the MFAT to evaluate their curricula and measure the progress of their students. The exams are given (on campus) on:

November 17th and **18th** from 6:30-8:30 p.m.

The exams are also given in **February**.

Please see **Sheila Boyer** in the CSO office to register for the exam. The fee for the exam will be paid by the Department of Math & C.S. To find out more about the MFAT, visit the website www.ets.org/mft.

MATH Challenge on November 7th

You are invited to participate in the 21st annual MATH Challenge, held on **Saturday, November 7th**. The **MATH Challenge** is a *team-oriented*, 3-hour exam consisting of ten interesting problems dealing with topics found in the undergraduate math curriculum. Teams consist of 2 or 3 students, and you'll take the exam on campus from 9:30 am to 12:30. You may form your own team or you can simply be placed on a team. Before the exam, you'll be provided with a “hearty breakfast” of waffles, bagels, donuts, and juice. If you're interested, contact Professor Sipka.

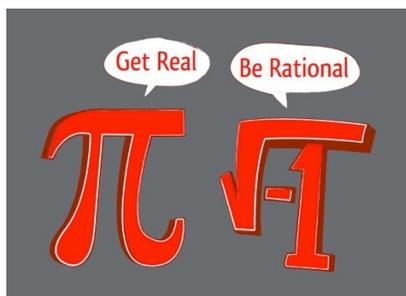
Math Help Center Hours

Monday – Thursday, 7-10 pm in Dow L2

The Math Club

The Math Club meets **EVERY TUESDAY** at 9:00 pm in Dow 132. Please come.

Everyone
is
welcome!



Ghost Series

In the spirit of Halloween, I will introduce the concept of ghost series, a relatively new idea first presented in an article from 2014 at the Cornell University Library. This paper, by Shashank Kanade, *et al.*, called “*Ghost Series and a Motivated Proof of the Andrews-Bressoud Identities*,” introduces ghost series as a natural mechanism that drives this specific proof.

The Andrews-Bressoud Identities are an extension of the classical Rogers-Ramanujan Partition Identities. Partitions are ways to split up a number into a sum. For example, 5 can be written as $2+2+1$. The Rogers-Ramanujan Identities are identities of partitions with special conditions. The Andrews-Bressoud Identities extend these conditions to discuss only even moduli. To prove these identities, ghost series were invented.

Essentially, a ghost series is a series that is very similar to the original series in the proof, but is constructed so that a transition can be made from the original series to the ghost series and back again through legitimate mechanisms and performs a purpose that the original series cannot. In this case, the motivated proof discussed by Kanade and his partners involves shelves of formal series. They needed a way to move from shelf to shelf in the series, and they used a ghost series to do so. According to Kanade, *et al.*, “Given the j^{th} shelf of ‘official’ Bressoud series, we introduce relations which simultaneously define a j^{th} shelf of ‘ghost series’ and also facilitate the passage to a $(j+1)^{\text{st}}$ shelf.” Through the use of a ghost series, the proof could be completed. To learn more about the proof of the Andrews-Bressoud Identities or about the ghost series utilized in the proof, visit: <http://arxiv.org/abs/1411.2048> . Christine Wiersma

Previous Puzzle of the Bi-week

Suppose f is a polynomial of degree SIX such that $f(n) = \frac{1}{n}$ for $n = 1, 2, 3, 4, 5, 6, 7$.
FIND $f(8)$. NOTE: The answer is **not** $\frac{1}{8}$.

Hint: Consider the polynomial g defined as $g(x) = x \cdot f(x) - 1$.

No solution was submitted to this problem, so there remains a \$2.00 reward to the first student who submits a correct solution.

Puzzle of the Bi-week

Here’s a sample problem from the math MFAT exam.

The function f is differentiable on the interval $0 < x < 4$. If $f(1) = 1$ and $f(3) = 7$, then for some $1 < c < 3$, $f'(c)$ must be equal to *what value*?

A prize of **\$2.00** will be awarded to the 1st student who submits a correct solution to Prof. Sipka.

Student assistants: Christine Wiersma/Jacob Blazejewski
Faculty advisor: Tim Sipka
Distribution: Deb Smith

If you would like to submit an announcement or a short article, please send it via e-mail to Tim Sipka (sipka@alma.edu).