Abstracts for Invited Talks

Thursday Morning, May 28, 2009

"Calculus as a High School Course" by David Bressoud

Over the past quarter century, 2- and 4-year college enrollment in first semester calculus has remained constant while high school enrollment in calculus has grown tenfold, from 50,000 to 500,000, and continues to grow at over 6% per year. We have reached the cross-over point where each year more students study first semester calculus in US high schools than in all 2- and 4-year colleges and universities in the United States. There is considerable overlap between these populations. Most high school students do not earn college credit for the calculus they study. This talk will present some of the data that we have about this phenomenon and its effects and will raise issues of how colleges and universities should respond. I will also discuss how Macalester College is responding to this challenge.

"Computer Gaming: The Good and the Bad" by Lori Carter and Anna Hail

The computer gaming industry has had a tremendous impact on the field of computer science. Many of our students choose to major in computer science because of their fascination with computer games. The desire to produce faster, more realistic computer games has been a driving force in pushing processor speeds and memory capacity. Students are motivated to learn challenging programming features using assignments based around computer game design. On the other hand, for many, computer gaming has become a dangerous obsession. Degrees have been forfeited, jobs lost and families neglected because of problematic gaming. This talk looks at the benefits of computer gaming along with the results of research regarding problematic computer gaming recently conducted at Point Loma Nazarene University. We will share some fascinating statistics concerning the extent of the problem in universities, who is at risk, why students play and why professors of mathematics and computer science should be particularly interested.

"Mathematics Research with Undergraduates: Stories of Personal Success"
by James Sellers

For the past fifteen years of my career, I have enjoyed working with undergraduates on mathematical research projects of various types, from senior capstone experiences and research-intensive independent study courses to full-fledged research projects. I have found each of these experiences truly enriching, especially those endeavors which ended with refereed publications. (I have been privileged to write half a dozen papers with undergraduate co-authors!) In this talk I will share many of the details of these experiences. I will strive to answer the "why" and "how" of doing mathematical research with undergraduate tudents, from my perspectives at a small school (Cedarville University) and a large school (Penn State University). My hope is that I will inspire you to complete such projects with your students and that you and I will get to talk about some mathematics along the way.

Friday Morning, May 29, 2009

"Stories from the Development of Real Analysis" by David Bressoud

Analysis is what happened to calculus in the 19th century as mathematicians discovered that their intuition of how to apply calculus was failing them, especially as their repertoire of infinite series expanded. The conceptual difficulties that they encountered are precisely where we should expect our own students to have trouble. Understanding how these controversies were resolved illuminates many of the definitions, axioms, and theorems that baffle our students. This talk will focus on one or more of three broad issues that arose during this century and that caused both controversy and confusion as they were straightened out: What do we mean by convergence of a series of functions and when, for the purposes of calculus, can we treat an infinite sum of functions as if it were a finite sum? How did our modern understanding of the Fundamental Theorem of Calculus asrise, and what does it really say? And how did we get the Heine-Borel Theorem?

"Revisiting What Euler and the Bernoullis Knew About Infinite Series"
by James Sellers

All too often in first-year calculus classes, conversations about infinite series stop with discussions about convergence or divergence. Such interactions are, unfortunately, not often illuminating or intriguing for students. Interestingly enough, Jacob and Johann Bernoulli and Leonhard Euler (and their contemporaries in the late 17th and early 18th centuries) knew quite a bit about how to find the "exact" values of numerous families of convergent infinite series. In this talk, I will demonstrate some "exact" results in this vein and gently argue that we should show more of this kind of material to our first-year students. The talk will be accessible to anyone interested in mathematics.

"ACMS – Some Reflections of What We Uniquely Have to Offer" by Jim Bradley

This talk will present the speaker's vision for the mission of ACMS. It will consider some plausible connections between mathematics and theology and some big questions that Christian mathematicians might fruitfully explore. It will also examine the current cultural norms of the mathematics guild, why these are problematic for Christians, and some possible ways ACMS members might respond.