SUMSRI Journal
Introduction

The Summer Undergraduate Mathematical Sciences Research Institute (SUMSRI) is a program designed to prepare participants for the rigor and pace of graduate school. Because of the small number of African Americans, Latinos and Native Americans with doctoral degrees in the mathematical sciences, we are particularly interested in these undergraduate students. In order to prepare these students, the Institute offers short courses, research seminars and colloquia for seven weeks. It is an intense program in which the undergraduate participants learn what it means to focus entirely on mathematics and statistics as one would do during a graduate program. Each course, seminar and colloquia is designed to fulfill the following goals:

- Address the shortage of underrepresented minorities and women mathematicians by producing minority and women research mathematicians.
- Provide the participants with a research environment and improve their research abilities.
- Improve the participants' ability to work in groups and give them a long term support group.
- Provide role models.
- Improve the participants' technical writing skills.
- Give the participants an opportunity to give a talk and to write a technical research paper.
- Familiarize the participants about graduate school and inform them about available financial aid for graduate school.
- Make the participants an awareness of career opportunities in the mathematical sciences.
- Prepare the participants for the GRE.

This preparation will, hopefully, permit the SUMSRI participants to successfully compete and complete graduate school.

In the summer of 2005, the Institute offered research seminars in number theory, abstract algebra and multivariate statistics. Participants also attended workshops in mathematical writing, GRE preparation, two short courses in algebraic topology and real analysis as well as eleven colloquium talks.

Applications for participation in the institute came from across the nation. In order to be chosen, each applicant had to be a U.S. citizen or permanent resident and must have completed college level introductory mathematics and/or statistics courses and at least one proof-based mathematics course. Each applicant wrote a brief essay on why they wished to participate in the Institute. Two recommendation letters from faculty members from the applicant's home institution were received for each applicant. In 2005, fifteen participants were accepted. The average GPA in the mathematical sciences for this summer's participants was 3.84. Eight of the participants were African American, two were Hispanic and five were Caucasian. Ten of the 15 participants were female.

Research seminar instructors suggested topics that would challenge students to work in teams, draw on their critical thinking and research skills, familiarize them with current literature on the topic, set parameters of the research and utilize computer modeling programs.

In Multivariate Statistics, Joshua Svenson and Monique Owens used multivariate statistical analysis techniques such as discriminant analysis and principal component analysis to gain insight into the variables associated with drug abuse. AdriaAnne Demski and Janelle Jones explored female empowerment around the world using these same techniques.

One team in the Algebra group, including Camil Aponte, Patrice Johnson and Nathan Mims, looked at line graphs of zero divisor graphs. Another team, including Natalia Córdova, Clyde Gholston and Helen Hauser, looked into the structure of zero-divisor graphs.

The Number Theory group, including Kathleen Ansaldi, Allison Ford, Jennifer George, Kevin Mugo and Charles Phifer, looked at a family of elliptic curves and its torsion subgroup to search for curves with large rank.

Final presentations of the research projects were given using Power Point slides. Members of the Miami University Mathematics and Statistics Department attended these presentations. It is hoped that many of these students will attend regional and national mathematics and statistics meetings in order to present the results of their work.

By providing this intensive research program, we endeavored to encourage those who attend SUMSRI to pursue advanced degrees.

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