Abstracts of Posters
Mathematical Outreach Programs
2019 Joint Mathematics Meetings
Baltimore, Thursday, January 17, 10am-noon

Title: Bearcat Math Circle Club
Presenter: Christina Therkelsen and Vita Borovyk, University of Cincinnati

We will share the outreach program we developed in Fall 2017, the continuation of which is now supported by a Tensor-SUMMA Grant from the MAA. As mathematics faculty at the University of Cincinnati, we worked closely with a 7/8th grade teacher in a Cincinnati Public School. In mathematics, this school ranks as one of the lowest performing schools in the state of Ohio. Each week we brought undergraduate volunteers, a fun math activity, and lunch to a room full of 7/8th grade students. Our goal is for the kids to have fun doing math in a relaxed setting, and to see that math is not always what they encounter in a classroom focused on test preparation. We also want to show our belief in these students' capability for success, and to give them an opportunity to consider future aspirations that they may not have been exposed to before.

Title: Inspired By Math Program: Inspiring a Love of Math in Younger Students Year
Presenters: Qiang Shi and Shibo Gao, Emporia State University; Laura Albertson and Ashley Burkett, Emporia Middle School

Inspired by Math is a math enrichment program in Emporia, Kansas. The program attracts motivated and talented middle school students in Emporia and nearby communities. We are in the third year of the program. We had a successful 4-day summer camp in July. In the fall semester, students worked on the AMC 8 problems and other math projects, and attended math talks. This presentation will give an overview of the program objectives and structure, introduce the math activities we have been doing, analyze quantitative and qualitative assessment results, and discuss the ongoing effort of involving more students in the program. The 2018-2019 Inspired by Math program is funded by Dolciani Mathematics Enrichment Grant, Emporia State University, Emporia Middle School, and Wolf Creek Nuclear Operating Corporation.

Title: Lamar University STEM Students of Color Alliance
Presenter: Jacqueline Jensen-Vallin, Lamar University

The Lamar University STEM Students of Color Alliance (SSOCA) launched in Fall 2018, modelled after the Iowa State Mathematicians of Color Alliance. The goal of this group is to support students interested in STEM fields by providing role models and rich mathematical experiences, and by building a community of scholars on our campus. So far this group has hosted three guest speakers and has several social events (involving food!) planned. This poster will highlight previous events, and explore future plans.

Title: Girls Exploring Mathematics
Presenter: Meghan De Witt, St. Thomas Aquinas College

We describe an outreach program creating math clubs for girls in local high schools, sponsored by MAA/Tensor. Four undergraduate female math students are taught to design and prepare a lesson plan and then brought to two different local high schools where they teach an after school club. Topics include graph theory, card tricks and base 3 arithmetic, and playing with statistics. Each club meeting covers the necessary mathematics, highlights the history of the topic, and culminates in a creative art project utilizing their new-found knowledge.

Title: All Girls Math Academy 2018
Presenter: Yasanthi Kottegoda, University of New Haven

In the Status of Women & Girls in New Haven, CT Report, researchers found that, "Changes to public policies and program initiatives provide opportunities to create a better future for women and girls in New Haven. Recommended changes include....female-specific programs in New Haven, implementing strong career and education counseling for girls beginning in elementary school." The lack of opportunities for low cost STEM enrichment programs undermine the social and economic prospects for girls in New Haven and justify the need for a summer math camp. The University of New Haven All Girls Math Academy is a one-week summer enrichment program in Mathematics and Computer Science for girls entering grades 7-10. The curricula provide a hands-on experience for the campers in math to which they would have had little or no prior exposure, thus challenging any disparities that would exist in their prior knowledge. The main objectives are to improve recruitment and retention of girls in math and computer science majors and careers by increasing awareness of career options, demonstrating that mathematics can be fun and challenging, strengthening problem solving skills, improving attitudes, self-image in mathematical literacy and also developing written and verbal communication skills.

Title: Summer Illinois Mathematics Camp
Presenter: Claire Merriman, Emily Heath University

The Summer Illinois Mathematics Camp is a free, week-long math day camp for middle and high school students. The program is run by graduate students, who design courses in collaboration with undergraduate teaching assistants. We will discuss how camp has expanded over four years, what we learned from changing the structure of the camp, and our plans for improving the model for future summers. The poster will include data and reactions from student pre- and post-surveys, as well as reflections from instructors and teaching assistants. Support is provided by University of Illinois at Urbana-Champaign Department of Mathematics, Illinois Geometry Lab, and our student chapter of the Association for Women in Mathematics; Mathematical Association of America Dolciani Mathematics Enrichment Grant; and the National Science Foundation DMS-1449269.

Title: A model for cross-institutional collaboration: how the intercollegiate biomathematics alliance is pioneering a new paradigm in response to diminishing resources in academia
Presenter: Olcay Akman and Megan Powell, University of North Carolina at Asheville

We present an emerging model of shared academic, intellectual and infrastructure resources that addresses the need for institutions to sustain their educational and scholarship missions under ever-declining funding. The (IBA) was created in 2014 by Illinois State University for this purpose, eventually growing to a state-recognized 'Center for Collaborative Studies' in 2017. As the impact of the IBA continues to expand, it is on its way to become a new education paradigm in response to diminishing resources, and it can serve as a model to foster collaboration for other fields of mathematics.

Title: Joining Math Club Forces: Making High School Students Excited to Learn Math and Undergraduate Students Excited to Teach Math
Presenters: David Thompson, Gabriella Harris, and Kimberly Corum, Towson University

As one of the leaders in teacher preparation in Maryland, Towson University (TU) has a number of partnerships with K-12 schools across the state. One such partnership is between the Math Education Club at TU and the Math Club at Digital Harbor High School (DHHS). David Thompson, a mathematics teacher at DHHS and a graduate of TU, founded the Math Club at DHHS in the 2016-2017 academic year and the club has since grown to be one of the most popular co-curricular activities at the school. From the 2017-2018 DHHS graduating class, all of the students who were members of the Math Club are currently in college and a majority of them are pursuing majors in the STEM fields. Students meet monthly during the school year to explore real-world applications of mathematics as a way to increase their interest in and passion for mathematics. They also attend a STEM Day field trip at TU, which also provides them with the opportunity to tour the TU campus and interact with undergraduate students. The Math Club at DHHS has also become a space for TU undergraduate students majoring in education to gain classroom experience by planning and leading several Math Club meetings each year. Many of these TU students have disseminated the activities they implemented with the Math Club through regional, state, and national conference presentations. By joining math club forces, the TU Math Education Club and the DHHS Math Club have been able to consistently provide meaningful outreach opportunities for both high school and undergraduate students.

Title: Mathematical Confluences - a partnership between Temple University and the Philadelphia High School for Girls
Presenters: Maria Lorenz and Irina Mitrea, Temple University

A successful partnership between Temple University and Philadelphia High School for Girls, a college preparatory school serving primarily minority students in North Philadelphia, was started in the Fall of 2017. We have partnered in a variety of activities including a visit to Girls' High by Temple faculty and students to run a workshop on cryptography; inviting the high school students to attend our annual Sonia Kovalevsky Mathematics Day for Girls with the intent of the group participating as session leaders for middle school students this coming spring; providing a "Math Bootcamp" during the first weeks of school to review summer work assigned to students; and providing regular tutoring at the high school. Thus far the program has proved richly rewarding for all involved.

Title: Vertical Integration in Mathematics
Presenter: Laura McSweeney, Fairfield University

This poster discusses the creation of the Fairfield Woods Middle School (FWMS) team of Mathletes, which was supported by the MAA's Dolciani Mathematics Enrichment Grant Program. We highlight the many activities of the program, which were designed to expose the Mathletes to more advanced mathematical ideas, while improving their ability to collaborate and communicate with their peers. We also describe the intentional vertical integration of mentoring and collaboration between the middle schoolers at FWMS, the Mathletes, their teacher, and Fairfield University undergraduates and faculty, as well as the challenges and successes of the program so far.

Title: Bridge to Enter Advanced Mathematics (BEAM)
Presenters: Ruthi Hortsch and Jacob Castaneda, Bridge to Enter Advanced Mathematics

Bridge to Enter Advanced Mathematics (BEAM) asks itself, "what do most scientists, mathematicians, engineers, and programmers do growing up?" and then, "how can we bring those same opportunities to underserved students?" BEAM organizes summer programs for low-income 6th and 7th graders, both a non-residential program that runs in LA and NYC and a residential program on college campuses in Southern California and upstate New York. BEAM then supports those students from 8th-12th grades in finding great high schools, taking algebra while in 8th grade, and accessing other enrichment programs such as math circles and summer programs. Through its work, BEAM has helped to diversify other enrichment programs and to give students a realistic chance at the career of their dreams.

Title: IC Women in Math
Presenter: Megan Martinez, Ithaca College

In this poster we will present the events we have hosted as part of the Tensor Women and Math Grant at Ithaca College. As part of this project we have a mentoring program that pairs first year math majors with junior and senior students, a series of talks featuring women who use mathematics in their career, and a high school "IC Women in Math Day," focusing on reaching out to the community. These activities are supported by a Tensor Women and Math Grant, as well as the Ithaca College Department of Mathematics.

Title: Girls Talk Math - Engaging Girls through Math Media
Presenter: Francesca Bernardi and Katrina Morgan, University of North Carolina at Chapel Hill

Girls Talk Math is a free 2-week-long day camp for high-school students identifying as female or from an underrepresented gender. Founded in 2016 at the University of North Carolina at Chapel Hill, GTM ran for the third time last summer funded by the Mathematical Association of America Tensor Women and Mathematics Grant. In July of 2018, a sister camp at the University of Maryland at College Park had its first run. Campers complete challenging problem sets and research the life of female mathematicians who worked on similar problems. They report their work in blog posts and podcasts (media available

at www.girlstalkmath.web.unc.edu). The camp curriculum was developed by Mathematics graduate students at UNC from an inquiry-based learning perspective. Problem set topics include theoretical and applied mathematics.
Camp received positive feedback from the local community and interest from other Universities. The program is evaluated through pre- and post-surveys measuring campers' confidence and interest in enrolling in higher level courses in STEM. Results from the past three summers have been encouraging and curricula are now available online with open access.

Title: Advanced Mathematics Program
Presenter: Tim McEldowney, University of California at Riverside

At most universities in Southern California the undergraduate math majors are more racially, ethnically, and culturally diverse compared to our math graduate students and faculty. To address this clear gap in retention and advancement in mathematics, we formed the Advanced Mathematics Program (AMP) at UC Riverside. AMP is devoted to equity through advancing the careers of our underrepresented undergraduate math majors. To accomplish this goal, AMP holds preparatory seminars in abstract algebra and real analysis. Also, it offers talks from active mathematicians, mentoring, and assistance in applying to conferences. The 2018 program took place from July 2 to July 27 and was funded by two grants: the NSF INCLUDES project Women Achieving Through Community Hubs in the US, which financed 10 female participants of the program; and the 2018 MAA Tensor-SUMMA (Strengthening Underrepresented Minority Mathematics Achievement), which funded a further 10 underrepresented minority participants in the program. We will present feedback gathered from the participants during the program on the program's influence and their success since then.

Title: Si Se Puede (Yes You Can – Do Mathematics and Science)
Presenter: Betsy Yanik, Emporia State University

After over twenty years of hosting multiple outreach programs for young women, Emporia State has branched out during the last ten years to hosting STEM outreach programs for Hispanic and Latino middle school students. This poster describes Si Se Puede (a one day statewide outreach event) where middle school students participate in a variety of hands-on workshops all lead by Hispanic professionals.

Title: Girls Talk Math: Promoting the Representation of Women in Mathematics
Presenters: Sarah Burnett and Cara Peters, University of Maryland- College Park

Girls Talk Math (GTM) is an inexpensive two-week, all-day day camp for high school students at the University of Maryland - College Park that promotes participation of women in mathematics. This program features three interconnected components: (i) to explore new mathematical concepts, (ii) to learn about the role of women in math and their current contributions to the field, and (iii) to develop verbal and written communication skills.

In its inaugural year at UMD, GTM accepted 36 individuals who identify as female or non-binary in the rising-9th through rising-12th grades residing in the Washington DC metropolitan area. Graduate and undergraduate volunteers were assigned to mentor groups of participants on a

particular topic in abstract geometry, applied mathematics, scientific computing, or cryptography. The goal of this camp is two-fold: to provide an opportunity for young women to realize their potential for a career in math, and to create a sustainable community of female mathematicians in the Washington DC metropolitan area. This summer program is an adaptation of the University of North Carolina's GTM camp, preserving much of its structure and utilizing its materials with the support of the UNC co-founders, Francesca Bernardi and Katrina Morgan.

Title: The Stevens Math Circle and Math Olympiad Initiative
Presenters: Jan Cannizzo and Andrey Nikolaev, Stevens Institute of Technology

As part of its outreach efforts, the Department of Mathematical Sciences at Stevens Institute of Technology piloted two Math Circles at local public schools in the fall of 2017. Our Math Circles rely on talented undergraduate and high school students delivering content prepared by experts to elementary and middle school students. We believe that this model has significant promise, as it benefits two different student demographics (younger students who receive mathematical enrichment and older students who gain teaching experience) and is more amenable to growth than Math Circles run solely by professional mathematicians. Thanks in part to funding provided by the MAA, we were able to expand to six Math Circles in the fall of 2018, with plans for further expansion in the spring of 2019.

Since 2016, the Department of Mathematical Sciences at Stevens has also hosted an annual Math Olympiad open to all students in grades 3-12 free of charge. In 2019, the Stevens Math Olympiad will be partially supported by the MAA. We expect it to attract approximately 400 students.

Title: PRIME: Pursuing Research in Mathematical Endeavor
Presenter: Roberto C. Soto, California State University, Fullerton

Our project aims to promote research among undergraduate mathematics majors, especially those from underrepresented groups in the mathematical sciences, by providing early research experiences and a sense of community for the members of the PRIME Club. The PRIME Club is a network of underrepresented students that provides a safe space for its members to discuss their journey in mathematical research by engaging with professional mathematicians and students from underrepresented groups. Our project also promotes opportunities to learn about mathematical research by providing support for students to travel to local and regional conferences and by organizing professional development workshops for students that seek to take advantage of research opportunities.

Title: Kittitas Valley Math Circle, Creating a Math Circle that meets our community needs
Presenters: Brandy Wiegers, Central Washington University

For more than twenty years K-12 students have been gathering in classrooms after-school to explore problem-solving and non-curriculum based mathematics through faculty run Math Circle programs. We have seen many variations of these programs and most recent versions have started to look at not just creating the program and instead reaching into the community to create

more critically engaged projects that both encourage students to reduce community mathematical illiteracy and engage in long term STEM engagement. This is what we created with the Kittitas Valley Math Circle. Starting with an elementary program, we have expanded the program to include math outreach for the parents and guardians in our community and have used this knowledge to recently start an MAA TENSOR-SUMMA sponsored Spanish language Math Circle. This poster will share the lessons learned and recommendations for creating your own program.

Title: Texas Women in Mathematics Symposium 2018
Presenters: Yuliya Gorb, Kayla Bicol, and Duong Nguyen, University of Houston

The Texas Women in Mathematics Symposium (TWIMS) is a 2-day conference for Texas-based mathematicians. The goal of TWIMS is to strengthen the network of female mathematicians in Texas, which will encourage collaborations and mentoring relationships. In addition, participants have the opportunity to: (1) learn about the research of other women in Texas, (2) present their work in a supportive environment, (3) network with other Texas women mathematicians, and (4) explore issues surrounding being a woman in mathematics. Conference activities include parallel talk sessions Saturday and Sunday, a breakout session, professional development seminars, and a keynote address.

Title: GIMS: Girls in Math @ South
Presenters: Selvi Beyarslan an Elena Pavelescu, University of South Alabama

As part of our Tensor grant, we organized a one day on campus event called "Girls in Math Day @ South" for middle school girls in September 2018. In addition to our annual event, we have started a year long math club at Williamson Middle Grades Preparatory Academy. The club meetings are held monthly on their campus. Williamson Middle Grades Preparatory Academy have test scores which fall below or far below the state average (41%), with Math scores as low as 12%. One of the reasons for us to target this particular middle school is to boost their academic performance by raising interest in mathematics through our math club activities.

Title: The GirlsDoMath in Western Colorado
Presenters: Tracii Friedman and Cathy Bonan-Hamada, Colorado Mesa University

Colorado Mesa University is located in rural, western Colorado, over 200 miles from the nearest major university. In our region, there are limited enrichment experiences for accelerated middle school mathematics students and none specifically for girls. Our camp originated from a desire to bring together a group of young women who share a love for mathematics so that they could explore, in a supportive environment, exciting topics in mathematics that they were not likely to have seen in their traditional school curriculum. We wanted to create a culture shift for these girls, improving their perceptions of women as mathematicians; encouraging them to see themselves as mathematicians. The result of our efforts is the GirlsDoMath Summer Enrichment Camp.

GirlsDoMath was offered for the first time in July 2018 and was supported by an MAA Tensor Women and Mathematics Grant. Our campers learned fun, new mathematics topics in the areas

of Knot Theory and Dynamical Systems and participated in mini-research experiences that culminated in poster presentations of their results. During camp week, we broke up our research time with outside speakers whose topics ranged from career talks to cool math tidbits to Tai Chi. Our poster will include an overview of the GirlsDoMath Summer Camp experience including follow-up activities and a description of how we achieved our camp goals.

Title: Jackson State University Girls Engaging in the Mathematical Sciences Program
Presenters: Jana Talley and Carmen Wright, Jackson State University

In its second year the JSU GEMS summer program has continued its efforts to (1) engage middle school girls in rigorous mathematics learning experiences, (2) introduce them to the process of applying to college, (3) expand their awareness of mathematics-intensive careers, and (4) engage them in learning experiences that utilize technology. To achieve these goals the program offers daily rigorous content instruction by faculty in mathematics, computer science and bioinformatics. The program also comprises college readiness activities, technology-intensive projects, and a speaker series by practitioners in mathematics-intensive career fields. This poster will explain the techniques used to ensure the program activities address content knowledge needs of local students; increase participants' propensity to enroll in mathematics-based coursework and extra-curricular activities; and develop a community of mathematics enthusiasts among local middle school girls. The poster will also include reflections from both the participants and members of the leadership team that point towards next steps for improving the program for future JSU GEM cohorts.

Title: Research Involvement: a tool to attract non Math majors and to help broaden their mathematical experience
Presenters: Fazal Abbas and Lisa Coulter, Stetson University and Anurag Agarwal and Petko Kitanov, Rochester Institute of Technology

In this study, we discuss results where undergraduate non-majors were involved in research projects early in their academic careers. It was found that such students were more likely to continue to study mathematics, and some became math minors. For instance, a group of non-math major undergraduates was involved in research on a mathematical model in astrophysics for three semesters. This experience motivated these students to continue their study of mathematics, and some even became math minors. In addition, these students presented a poster at the January 2018 Joint Mathematics Meetings and later those results were accepted in a peer-reviewed international journal. By participating in a project-based mathematics course offering students learned the importance of understanding mathematical tools in various research disciplines. We observed that engaging sophomore students in such independent research study courses caused them to understand the usefulness of mathematical techniques better. Because of these experiences, we propose a project where we would bring high school teachers and students to campus for a workshop. We are hoping their exposure from faculty, and industry professionals about the way math is used in real-world settings.