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January 28, 2019

Dr. May,

My name is Kenneth DeMason, and I am a third-year undergraduate at UF majoring in mathematics. I am applying to the REU at the University of Chicago and am highly interested in attending. By attending this program, I would both gain valuable knowledge, which would aid me in graduate school, and build relationships with other like-minded individuals.

I first became interested in mathematics in high school. As a student in the International Baccalaureate program, I wrote a mathematics paper on a way to approximate the inverse of  $y=x^x$ . It turned out that this was just Newton's method in disguise, but the process of finding what I thought to be my own method was fascinating. I continue to enjoy studying a variety of small problems and independent learning. This past August, I began my first mathematics research project on Minimal surfaces. I investigated the catenoid, the only minimal surface of revolution. As part of this, I worked out a simple proof of this property, and another unique property of the catenoid concerning a relation between its surface area and volume (which neither my advisor nor I have seen discussed before). Afterwards, I extended a formula given by do Carmo (on the initial rate of change of surface area when a surface undergoes a normal variation) to general smooth vector fields. I enjoyed these topics because they were both questions I proposed myself and was later able to solve, and they provided an important foundation for working with surfaces. I have since transitioned to investigating Delaunay surfaces under the Ricci Flow and am currently familiarizing myself with the properties of Delaunay surfaces. I changed topics so that I can eventually make my way to the more abstract areas of differential geometry. These projects motivated me to complete the graduate analysis sequence, take a course in Curves and Surfaces, and study from do Carmo and Montiel & Ros on my own.

I am interested in this REU in particular for a multitude of reasons. For one, the University of Chicago's caliber will, I believe, challenge me intellectually and help me grow as a mathematician. If they are in attendance again, I would be very interested in meeting Dr. D. Calegari, since he spoke on hyperbolic geometry at last year's program, and Drs. Weinberger and Neves. Furthermore, the presentation requirement will help bolster my ability to communicate mathematical knowledge, an important skill for oral exams and giving talks at conferences.

In addition, I currently work with an advisor in a very similar fashion to the REU program. We have one on one time to discuss the project, learn material and get to know each other. I enjoy this type of directed work, so the REU will be a good fit for me. I have already looked in to potential mentors, and I believe Liam Mazurowski would be the best choice. Of importance, he has participated in the REU in the past, and his students have written papers on curves and surfaces (see: Kevin Yan, 2018). As I understand, the mentors are graduate students. I am close to a good portion of the graduate mathematics students at UF, so I look forward to being mentored by a graduate student.

I believe I have the required background knowledge and motivation to conduct research. I hope you will afford me the opportunity to attend this program. Thank you for your time and consideration.

Regards,

Kenneth DeMason