Two Essays

1. Essay 1: Research interest statement (500 words or fewer)
   1. Select up to three desired research areas. (See section “MSR Research Areas” below).
   2. Answer the prompt: *What draws you to the desired research area(s) you selected and what impact would you like to have in that space?*
   3. Be sure to also describe:
      1. any relevant experience in this/these research area(s) or related technologies and
      2. how you expect to personally benefit from participating in this internship.

Life is unfair. But it does not have to be.

Using algorithms to meet this challenge is a very concrete way of addressing the issue of unfairness. Rigorously understanding fairness has a significant impact on society, and to some extent is one of the essential goals of economics. Indeed, the ultimate goal of any research is to improve humanity by making society more fair. Algorithms are uniquely positioned to address these issues, and the intersection between computation and economics has contributed to realizing a more egalitarian world in the past several decades. This idea of theoretical problems with practical social value has inspired me to do research in the field of algorithms, especially fair division.

Currently, I am interested in studying approximate algorithms for computing Maximum Nash Welfare allocations (an APX-hard problem) and its connections with equitability (EQX), especially due to its many strong fairness guarantees. These properties make it an extremely compelling problem for implementation, which motivates its usage in popular fair division applications. I further believe this work can be used to address issues surrounding poverty, such as hunger.

When I first began my undergrad, I researched in Human-Computer Interaction, because of its applications in a more technologically connected world. We worked on designing efficient text entry in virtual reality and augmented reality without handheld controllers, which is increasingly important as we become reliant on such technologies in the future. We currently have two research papers under submission in a top-tier conference and journal.

Currently, I am working with Professor Emily Fox at my university in an independent study setting and am writing a survey paper on fair division. I intend to continue to study economics and computation for a PhD after my undergraduate studies. The Microsoft undergraduate research program this upcoming summer will allow me to continue the prior research in computing fisher market equilibria and the Santa Clause Problem, and to find research questions relevant to both industry and society during my PhD.

1. Essay 2: Leadership in Diversity statement (250 words or fewer)
   1. Please describe ways you have contributed to increasing diversity and inclusion in your field and/or any unique challenges you may have faced and how you navigated those obstacles.

As I come to appreciate the possibilities of algorithms I am also motivated to ensure that it remains accessible to everyone. That is the spirit in which I began the Economics and Computation club at UTD. In the process of building this club, I am making an intentional effort to be inclusive of people from a diverse range of intellectual and cultural backgrounds. Women are generally underrepresented in my university’s algorithms programs, doubly so among undergraduates. Although the club is still only a few semesters old, our club currently has a nearly equal representation of gender and seems to be continuing to grow in that direction. People who show interest in our club come to us with a varied level of understanding of discrete math and algorithms. We make specific effort to include them in our club, by offering resources and tutoring outside of the regular meetings to help them more effectively participate.

Another effort that I am currently undertaking to make mathematics accessible to students is the book that I am writing. For many young students, exposure to math can feel alien and disconnected. My book hopes to use stories to connect directly with students, and to improve understanding of higher-level mathematical concepts in an accessible way. I hope to spark a passion for math in students with barriers to education in these fields.