1) What sparked your interest in computer science? How did this lead you to major in computer science and what do you hope to accomplish with your degree? In your answer, please describe how your experiences have influenced the goals you have for yourself.

I took my first computer science class in my sophomore year at Oberlin College. As a math major, I was captivated by how, by applying mathematical theory, I could build powerful tools, but I was bored by the simplicity of programming an existing algorithm. My professor, Alexa Sharp, urged me to continue with computer science and to take an algorithms class. In that class, I fell in love with the elegance of solving mathematical puzzles and the applicability of their solutions in the real world.

I sought out a summer Research Experience for Undergraduates (REU) where I studied a cost-sharing connection game. Academically, this project was a success; based on results from the summer, I published a paper at a regional conference. However, this REU experience was tainted by peers who were hostile toward women, and at that point, I decided against pursuing research. Later, this underscored the importance of advocating for women in computer science for me. Thankfully, my professors at Oberlin convinced me to give research another try, leading to a semester-long research project at Oberlin and then a second REU where a partner and I proved results in automata theory that were published in a top international conference. I learned that research is the process of posing questions that pique my curiosity followed by the intellectual thrill of hunting down solutions, and I decided to pursue it further in graduate study.

In pursuit of my PhD at the University of Washington, I am researching topics in Algorithmic Game Theory (AGT), where we consider an algorithm's performance in the presence of self-interested individuals who treat the process as a game, strategizing how to play it. Over the course of my career, I plan to use AGT to understand real-world problems with strategic input. First, I am interested in problems "in the wild," such as those arising in Bitcoin, distributed systems, and computer security. Second, much of known auction theory makes unrealistic modeling assumptions in order to develop elegant mathematical solutions. I aim to extend auction theory beyond these overly restrictive assumptions and have already achieved results doing so with my graduate advisor, Anna Karlin.

It was the support and encouragement of highly skilled and dedicated educators such as Professor Sharp and research advisors such as Professor Karlin that sparked my interest in computer science. They inspired me to immerse myself in research despite my late exposure to computer science and my first discouraging experience. I am pursuing a career in academia in order to produce theoretical solutions to real problems, communicate both my research and the foundations of computer science to a wide audience, create an environment where people of all backgrounds can comfortably pursue their career goals, and, like my own professors, mentor and encourage the next generation to join the ranks of the STEM workforce.

2) Please give us 1-2 examples of how you have exhibited leadership. Explain how you were influential, what you were trying to achieve and the impact you had as a result. These need not be demonstrated through formal or traditional leadership roles. Think broadly and examine the many ways you are having an effect on the members of your technical community, your university, or your broader community.

My own career in computer science was sparked by a professor who reached out and encouraged me. The biggest hindrance was an early event of gender-related discouragement by peers. As a result of these two experiences, I am committed to creating a space for women to support one another.

I founded and co-chaired Oberlin's Women in Math and Computer Science group, and I am the current co-chair of the University of Washington (UW) graduate Women-in-Computer-Science organization. At both Oberlin and UW, I facilitate meetings in women's groups to share experiences and build community. I have also facilitated department-wide conversations at both schools in order to make the community and classrooms more inclusive. At Oberlin, I arranged panels to help women apply to research and industry opportunities. At UW, I helped structure and I participate in a system where graduate women mentor undergraduate women. To improve the effectiveness of the first-year graduate mentoring program, I solicited feedback to improve group-matching and mentor training. My goal is that the infrastructure that I build through the systems that I create will both benefit the community and endure past my term at any program. I see it as a success that the group that I founded at Oberlin continues to meet and plan events. At UW, I see that my current efforts are successfully supporting women and raising awareness of how to better include and support people of all backgrounds.

As an educator, I give students a taste of areas that they might choose to pursue for the rest of their lives. My goals in teaching are (1) to encourage students to pursue careers in computer science, (2) to improve my communication skills, and (3) to engage a diverse group of students in learning a topic I am passionate about. To this end, I interned at an inner city Chicago public school where I turned standardized math test preparation into an engaging game. I also taught students about puzzles and card games to encourage them to spend their free time playing games that will develop their skills in arithmetic, probability, logic, and problem-solving, as students in this community are not so fortunate as to have parents encouraging such hobbies at home. I watched as students who claimed that math was uncool or impossible took an interest in the games I taught and began to change their attitude.

In addition, I have served often as a Teaching Assistant both at Oberlin and UW. Holding office hours allows me to help students develop an intuition for problem solving. By leading recitation sessions, I practice engaging all students in a diverse classroom, and I work to improve classroom dynamics using ideas brainstormed from department-wide conversations about inclusion. From my explanations, I see students come to grasp the material, and often come to love the topics and choose to pursue them. I watch my former students take computer science jobs in industry and I am currently helping a former student apply to graduate school in computer science.

3) Imagine that as a Google Anita Borg Memorial scholar, you are given the opportunity to speak to a group of female first year computer science students to encourage them to pursue their study in the field. They want to know what is exciting and interesting about computer science, and are specifically interested in hearing about your experiences and accomplishments. With this audience in mind, please describe the most significant computer science project or research you have worked on, how you approached key technical challenges, and what you gained from the experience. It might have been a class assignment, a research project or work as an intern. If the project was team-based, help them understand what it's like to work on a team by specifying your individual role and contributions in the project.

Auctions are everywhere in the age of the internet: buying and selling goods in electronic marketplaces, assigning ad-slots on search engines, selling cloud computing resources, and many other applications. In my graduate research at the University of Washington, my advisor and I designed a simple auction mechanism for selling multiple items that guarantees near-optimal revenue without requiring the auctioneer to have precise knowledge about the buyers.

Suppose you want to maximize Google's revenue from selling a variety of different keywords to advertisers. Each advertiser has a *value* for each keyword, or how much they are willing to pay. For any group of keywords, an advertiser's value is the sum of their value for each individual keyword. The auction that achieves maximal revenue is often very complicated to determine, implement, and participate in—Google could not possibly use it in practice. A recent paper by Andrew Yao suggests an auction that is simple yet still yields near-optimal revenue. I spent a month studying the ins and outs of this paper, gaining intuition for why the techniques worked, and presenting the proofs to my advisor until we were both experts on it.

However, to implement the auction from the paper, Google would need precise knowledge about the advertisers' preferences, which is an unrealistic assumption. The buyer population is constantly changing—new startups join the auction and events change the frequency of various Google searches. We decided our research goal was to extend Yao's auction to maximize revenue without precise knowledge about the advertisers.

A helpful and more realistic assumption is that Google may know that two buyers are equally likely to have any particular value, perhaps because they come from the same ZIP code. Prior work shows that, without any additional knowledge about how much these buyers are willing to pay, Google can use one buyer's bid to set a price for the other buyer and ensure high revenue, but these results do not extend to selling multiple keywords.

My advisor and I took Yao's simple auction and intertwined this idea for setting prices without knowledge. I constructed a simple auction that Google could actually implement in practice to sell multiple keywords. However, I hit a roadblock in proving that the auction's procedure for pricing a bundled group of keywords produces the revenue we want. After months of trying a variety of approaches to no avail, we thought to use a technique from another line of work to analyze the most highly-valued keywords separately from the rest. Using this, I was able to prove that using another buyer to set prices does in fact give the revenue guarantee we had hoped for.

This project taught me how to think individually, how to collaborate with my advisor, and how to tie together unrelated prior results to create a much-needed auction that Google could actually use. By studying computer science, I get to solve challenging theoretical problems and focus on how to ensure that their solutions can have an impact in the real world.

4) Dr. Anita Borg proposed the "50/50 by 2020" initiative, so that women earning computing degrees would be 50% of the graduates by year 2020. However, the percentage of computer science degrees earned by women is still far from 50% throughout the world.

A) Based on your experience/observation at your university, what percentage of women study computer science?

B) What is your university doing to encourage women to select technical degrees?

C) What cultural factors in your local community influence fewer women to select technical degrees? (Please specify if you are discussing your hometown/country, university community, etc.)

D) If you were the head of the computer science department at your university, what initiatives would you start to reverse the trend and increase the involvement of women in computer science?

(A) At the University of Washington, approximately 30% of undergraduate Computer Science (CS) majors and 20% of people in the PhD program are women.

(C) From my experience, there are three major factors that discourage women from selecting technical degrees in America. First, computer scientists are conceived to be men who work in isolation. This alienates women, especially if they are looking for something interdisciplinary or collaborative. Second, due to this stigma, women are often intimidated or disadvantaged due to being exposed to CS later than their male counterparts. Third is the concept of the "leaky pipeline," where women depart from CS careers at each stage further along in the process.

(B) At the University of Washington (UW), we have been working hard to combat these issues. Last year, UW received an award from the National Center for Women & Information Technology recognizing our department's successful efforts in (1) a redesign of the introductory course sequence to attract and engage students regardless of prior exposure to CS, (2) the creation of a collaborative undergraduate community, and (3) numerous outreach efforts to both high school women and teachers in order to patch earlier stages of the leaky pipeline.

(D) In my first year and a half at UW, I have organized graduate women's events to welcome first-years, to build community, and also to strengthen our relationships with the female professors. I am organizing this year's all-women conference where graduate students and professors present cutting-edge research and discuss the path of a research career to undergraduate women. I also helped structure a program for graduate women to mentor undergraduate women. These efforts aim to build a strong and supportive community among the women in CS and to patch the pipeline from undergraduate to graduate studies and from there to the next step in a career in computer science.

In addition to these efforts, as department chair, I would administratively make CS more accessible and improve the department culture. I would require faculty and teaching assistants to receive training in engaging a diverse classroom. Simple practices like waiting longer before calling on a student or allowing students to discuss their ideas provably engage more students from underrepresented groups. At UW, research labs vary widely in how collaborative the students are. I would train the faculty in how to foster opportunities for peer collaborations so that all students have the option of collaborative and even interdisciplinary work. Currently, there is a strict cap on the number CS majors, and classes are closed off to non-majors. This prevents women who are exposed to CS later on from pursuing it. I would open up all CS classes to non-majors who have completed the pre-requisites. This would make a partial CS education accessible and adequately challenging for students who want to explore computer science but did not discover this until later in their path. As I experienced first-hand, a late discovery of computer science should not stand as a barrier between a woman and either a research or industry career.