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Class of 2016, Dartmouth College

Odd Woman Out

As the sun begins to peep out from the horizon, its rays warming the frozen, New Hampshire earth, Carolyn Gordon stretches and performs her morning Tai-Chi. She cooks herself a hearty breakfast of oatmeal with an apple nuts and yogurt, passing on the coffee or tea. As she reads the Valley News, her three cats nibble on their breakfast beside her and her husband, David Webb, also prepares for his day of mathematical lectures at Dartmouth. Carolyn also has a dog, which currently resides with her daughter, a senior at the University of Massachusetts, preventing it from coming to campus with Carolyn. "My dog used to often come with me," she says, "but is now a transfer student." Carolyn, being quite active and enjoying the outdoors, walks to work each day, living only one mile away from campus.

Carolyn grew up in Charleston, West Virginia with her sister and two brothers. Her father was a pharmacist and her mother had a degree in social work. A math-lover from a young age, Carolyn acknowledges, "Math was always my best subject when I was small." In seventh grade, she made her first math discovery: a formula to figure out $(n+1)2$ if you know $n2$. She recalls her teacher being unimpressed: "Even though she didn't get it, it made me feel good." Carolyn continued to pursue her interest in mathematics despite obstacles. When Carolyn was in high school, calculus was just first being introduced. She, an anomaly in the mathematics realm of the 1960s, was in class with eleven boys. In fact, Carolyn was often teased for liking math, an area of study that was male-dominated. She owes her continued pursuance of the subject to her sister. Carolyn recalls, "She used to say, 'Doing math is like doing puzzles. It's fun.'"   When she was teased in high school for liking the subject, she would look at her sister, a fellow mathematician, and think, "Okay. I can get through this." Her sister would discuss being the only female in her college math classes. "When I had the same experience, it wasn't like I was really alone because there was this other, my sister, who was there."

Carolyn attended Purdue University, receiving a B.A. in Mathematics and a minor in Psychology. Having no plans for a career, it was a professor that prompted Carolyn to attend graduate school. "My mother always said, 'Wouldn't it be exciting to be married to a professor'" Carolyn recalls, "and this was the first time it occurred to me that I could be a professor."   She went on to complete her Ph.D. in Mathematics focusing on Riemannian geometry at Washington University in Saint Louis. After

achieving her Ph.D., Carolyn spent one year at the Technion (Israel Institute of Technology) before beginning her teaching career at Lehigh University. Working as a female professor of mathematics does not come without challenges, as females in the field were an oddity at the time. Students were not used to having female professors, a social norm that intimidated Carolyn. "I was certainly aware of being in a minority as a woman," she recalls, "[and] being comfortable in the classroom took me a while." After teaching at Lehigh for four years, Carolyn returned to her alma mater at Washington University, where she taught for 6 years before coming to Dartmouth College in 1990. One of her favorite courses she teaches at Dartmouth is Complex Analysis, as she is expected to challenge the more advanced students without losing the lesser advanced. "I love working with students," she says, "I think the most rewarding thing is when I am able to encourage a student, who may question her ability in math, to continue and then see her flourish."

Carolyn's research lies mainly in two areas. First are more abstract settings of odd shaped domains. Second is Lie Groups, an area that combines geometry and algebra. But the best problem that she has discovered is, "Can you hear the shape of the drum?"   It asks if you take an odd shaped membrane, could you tell from the frequencies what the shape is? As it turns out, there is a formulation one can visualize. She and her collaborators found the first examples of odd shaped domains, or drum membranes, with exactly the same frequencies. Carolyn continues to pursue her goal of researching and discovering new things. "I have had that experience," she says, "it's ongoing."

But Carolyn's interests are not all math-related. She is quite active, going to the gym one to two times per week, taking Tai-Chi classes, and attending a Tai-Chi workshop every summer. She loves to hike, especially Mount Cardigan and Mount Moosilauke, and will sometimes take a midday break after her lunch of almond butter, a veggie burger, and yogurt to stroll through Pine Park. Carolyn is an avid reader and participates in volunteerism. She has always wanted to do volunteer work in a developing country, and has gotten involved in an NGO in Guatemala, in which she visited and sponsored children for their education. Carolyn also loves to shower her nephew's sons, who are interested in math and chess, with books on the two subjects, hopefully sparking further curiosity.

As Carolyn anticipates the future, she looks forward to continuing her work with students, research, and advisory of the student chapter of the Association in Women in Mathematics. And, if all goes as planned, Carolyn will retire in four to five years, researching and tutoring on her own schedule, volunteering, and pursuing her hobbies.

About the Student

Amanda Fritz is a senior at Dartmouth College majoring in Mathematics and minoring in Creative Writing and German Studies. Her favorite mathematical area is probability, and she hopes to write a thesis on Network Theory. Amanda's other interests include baking, sewing, traveling, volleyball, and skiing.