Evelyn Lamb:	00:12	Hello and welcome to the Lathisms Podcast. I'm your host Evelyn Lamb. In each episode we invite a Hispanic or Latinx mathematician to share their journey in mathematics. Today I'm happy to be talking with Roberto Soto. Hi, how are you today?
Roberto Soto:	00:27	I'm doing well, thank you. How are you?
Evelyn Lamb:	00:29	Just fine. So can you tell us a little bit about yourself?
Roberto Soto:	00:34	Sure. I'm a first generation student, or was a first generation student, now a first generation mathematician at Cal State Fullerton. I grew up in the LA area. My family is from Guatemala. It's been an interesting journey to get to where I'm at today. Wasn't something that I had actually planned.
Evelyn Lamb:	00:54	Yeah. So maybe we can jump right in with what inspired you to become a mathematician? How you ended up on this career path.
Roberto Soto:	01:01	I guess I always had a fascination with numbers. My parents tell the story, when we would go to TJ (Tijuana), I guess to shop, I would be counting cars, and this is maybe when I was four or five so I don't quite remember this story, but they said I'd count the cars as I was going along and counting must've been fun for me because my mom would ask me what I was doing and I would say, "I'm trying to get to the last number in the universe." And of course she didn't prove to me yet that that was impossible.
Roberto Soto:	01:26	But then I do remember this part, when I was eight or nine I started learning how to add. I think I learned how to carry. So I was adding one plus one is two and two plus two is four, four plus four is eight, and I kept doubling but through addition, because I didn't know how to multiply yet.
Roberto Soto:	01:42	My mom let me do this for an hour or two. I had lots of pages. I had a really long number. Finally I guess she felt bad for me and she goes, "What are you doing?" I go, 'Well, I'm trying to get to the last number in the universe." She goes, 'No number exists that." And I'm like, "Yeah, there is." And so she asked me, "What's the biggest number you know?"
Roberto Soto:	01:59	I go, "A google. One with a hundred zeros." I had just read about it. And she goes, "Well I can think of a number bigger than that." And I'm like, "No you can't." And she said, 'Yeah, a google plus one." I was awestruck and just amazed at the fact that she was right.

Roberto Soto: 02:17 These are the things that fascinated me growing up. I didn't realize this was a career choice, thinking about numbers or thinking about things like numbers, were something that I can do as a career. And so growing up my family thought I was going to be an engineer, or a doctor, or a lawyer. I was really good at math, but they figured an engineer, because that's what they knew. Anybody from Guatemala that was good at math usually became an engineer. Nobody really became a mathematician.

Roberto Soto: 02:41 In fact, I became a high school math teacher, partially because, I wanted to teach, but the other part was I didn't really know what else you could do with mathematics. It wasn't until maybe eight years into teaching, maybe a little bit before, I met my wife at that time and she was so excited about math and I was excited to talk to her about math.

Roberto Soto: 03:02 She kept encouraging me, "Why don't you go back to school and get a Masters or a PhD?" I was a little afraid, but she was so positive that it did inspire me to do this.

Roberto Soto: 03:13 The other part that inspired me were my students at the time. My students kept asking me, "What do you do after calculus?" I was teaching calculus. "What do you do after calculus?" And I go, "You prove all these theorems and you learn all these awesome things, mathematical objects, that you don't really think about here in high school. It's really cool." I go, "You guys should study it. You should continue. You guys are really good at math. You should definitely continue studying it and fulfill your potential."

Roberto Soto: 03:36 And so these two messages are in me at the time. My wife is telling me, "you love math, you should consider doing it." And then I'm telling my students they should fulfill their potential.

Roberto Soto: 03:44 Eventually I realized, wait a minute, I really haven't done that at all. That's what started me on this journey. I went back to school, went to Cal State San Bernardino, got a Masters in math, needed a job because we were just recently married. And so I took a job in the district office, realized that wasn't really where my passion was, and then was fortunate enough to meet Phil Kutzko at the University of Iowa who welcomed me with open arms to Iowa and said, "You should come study here." And I did.

Evelyn Lamb: 04:14 It must've been difficult at that point in your life to move over so far from California and start this new journey.

Roberto Soto: 04:24 It was, but luckily my wife is an adventurer. I had been working for a couple of years. I was making a pretty good amount of money. It was California, so it was expensive, but still it was something we were used to a certain lifestyle and so moving out there, moving away from family, being that far away was definitely difficult. Being cold in Iowa the first year was hard. We were definitely homesick.

Roberto Soto: 04:50 But I think the environment where you end up is important, and Iowa was really... The people of Iowa, especially the department, the students and the department, they were very close. There was a culture there that I think I had only found one other place and that was when I was at San Bernardino. There was this, the students really supported each other, they work with each other. The professors cared about their students and their students' success and they had the support system there in place.

Roberto Soto: 05:19 I think that made it easier. And the fact that we were older too, my wife and I weren't young 22 year olds anymore. We were a little bit older at that time. So we had already seen life from a different perspective and we both talk about how being in Iowa was really a growth experience. We learned about how different other places are than in California. We also grew and started to appreciate the rest of the country and what that is like. As difficult as it was, it was also a lot of fun and a lot of growth.

Evelyn Lamb: 05:54 What math did you end up interested in in grad school?

Roberto Soto: 05:56 As I said earlier, I'm fascinated with numbers. I remember, this is the weirdest story, I tell my wife and she knows this is when you knew you should have been a mathematician, but I remember in junior high, it was an Algebra One, I was walking home and I started thinking about the lesson in algebra. We were discussing how when you add two numbers, the order doesn't matter. But in my brain I kept thinking A plus B equals to B plus A plus B equal to B plus A.

Roberto Soto: 06:23 I started running through all of these numbers that satisfied this property. I should have known them and I was going to be an algebraist, because obviously I like the symbols, I like the abstraction of numbers to letters, and so this is in essence when I was in Iowa, I'm like... In fact, I think this started even earlier at Cal State San Bernardino.

Roberto Soto: 06:41 Algebra always seemed to be the most attractive of all of them. I liked almost every single subject in math and I kept going back to algebra. So specifically what I do is it's called Representation Theory. I look at objects that are abstract, that maybe don't look mathematics, or don't even seem to have any properties that we would think of as math, at least when we were younger, and we try to take these objects that somehow remind me of numbers even though they're not, but they really remind me of numbers and we try to quantify them. Usually using matrices, other objects that really do remind me of numbers even more.

Roberto Soto: 07:18 In quantifying these abstract objects, we're able to study them and understand them at a deeper level. I also dabbled a little bit in what I call applied math ed research.

Roberto Soto: 07:29 One of the reasons I had trouble figuring out how to get to this place was I didn't quite have mentorship while I was in college or even in high school. I think nobody ever said, you can make a career out of math. And so part of me, when I'm at Cal State Fullerton, I think about our students and I think about there are some students here that really like math and when I asked them what they want to do with math, they either tell me they don't know, or they think that their only option is teaching, even though they don't seem too enthusiastic about it.

Roberto Soto: 08:00 This is when I start thinking about, okay, what can I do to help our students see the opportunities that weren't there for me and help them become prepared for these opportunities so that they can be successful, in whatever way success means to them.

Roberto Soto: 08:17 I think for a lot of them, for a lot of my students anyway, I feel success just means being able to do something that you love and help your family at the same time.

Roberto Soto: 08:27 Right now, part of my research is on how do I help students from underrepresented backgrounds become successful in STEM or in math? I anchor this through mentoring, but to me it's a three pronged approach to doing this work.

Roberto Soto: 08:45 Part of it, having been a high school teacher, it really what we do in the classroom really matters. I focus a lot, a little bit of my research is on active learning pedagogy. I work with Dr. Alison Marzocchi at Cal State Fullerton, and we work on training faculty, but also learning about what are the most effective practices in training faculty, math faculty, and implementing these active learning pedagogies.

Roberto Soto: 09:13 It's work that I think is necessary, especially since most of the faculty hasn't been trained as teachers. That background in having been a high school teacher has been really helpful in that.

Roberto Soto: 09:24 I also do a lot of research with my students currently, sorry undergraduates, because I think that's the other part of the puzzle. So you have your active learning part where you meet students and you make sure that they understand what math is about and they work together and you form a community. But it also provides me an opportunity to mentor.

Roberto Soto: 09:43 But then I also work with students individually during the summer to do research with them. And this can vary. The projects can vary depending on the student's interest, but the goal for me is exposing them to research, but also in creating a community and creating not only a mentoring relationship with me, but a peer mentoring relationship with students.

Roberto Soto: 10:02 And then using these students that have done research with me to leverage them to create a larger community at Cal State Fullerton. I think at Cal State Fullerton, like most of the Cal States, most of our students are commuters. So my hope is to create this community of students that can help each other out because it can be a lonely experience, at least from my experience. College could be lonely, especially if you're the first one and you don't know what it is that you're supposed to do. And so you just go stumbling across. So I guess my other interest has been this supporting of underrepresented students in math and STEM.

Evelyn Lamb: 10:41 And going back to something you said early, it's interesting to me how many people I've talked to for this podcast who mentioned that they really didn't know what you could do with a math degree other than be a math teacher, which of course is a wonderful profession, but it's not what everyone wants to do. Being able to tell people from a variety of backgrounds, get people, maybe other people who are first generation college students, to know that that math research exists and that this is something that they could do, is such an important thing.

Roberto Soto: 11:16 Definitely. I always try to use, not just my story but like you said, the story of others that I've met. We need to share this earlier. As early as possible. I think eventually what I would to do, and this is something in the future, a future project, but somehow go back to the schools that are similar to mine, or even go back to my old high school where not only did I attend high school

there, but I also went back to teach there, [inaudible 00:11:46] the high school in Baldwin Park, to share this even earlier.

Roberto Soto: 11:51 Some of the projects look for for students are projects that don't require students to be very, I guess, sophisticated in math. Because the goal is to get them to think, you can do math at any stage and you can have fun with it. If you do like it and you have fun with it, this is something you can make a career out of. Something I didn't know, which now I'm like, wow, I can't believe I'm being paid just to do math.

Evelyn Lamb: 12:13 Can you talk about some of the mentors you've had and how they helped you get on the path you're on?

Roberto Soto: 12:19 So first of all, my parents have been my first mentors. I think they've always encouraged us to pursue education and to work really hard. I think that was able to, for me, transferred in many areas in becoming a high school teacher and going to grad school.

Roberto Soto: 12:38 Just in my academic life right now, you put in the time, you put in the work, you do the best that you can, and you move forward as best as you can. Anytime you make a decision that maybe wasn't the best, it's okay. You learn from the consequences and you learn.

Roberto Soto: 12:52 My parents have been very firm supporters. In fact, when I decided to go back to school to get a PhD, their friends would tell them, "Why is he going back? He already has a career." And my parents were there to defend me and say, "No, this is something he loves. This is something that he wants to pursue." They've always been very supportive, so I appreciate them a lot.

Roberto Soto: 13:14 Then the other person that comes to mind right away of course, is Phil Kutzko. When I first met Phil, one of the first things that I liked was that, he was so welcoming and not just to me but to many people at Iowa. To have someone make me feel at home in a place like Iowa was really important to me to be able to be successful I think.

Roberto Soto: 13:35 When I did run into any issues at Iowa, whether I felt like I wasn't learning analysis, or when I doubted if I should become a pure mathematician, Phil was always there to talk to and talk through things and not always about just, math.

Roberto Soto: 13:50 He really, in essence, was doing what I usually do with my students. He was getting to know me. He was getting to know

what motivated me and what I wanted to do with a PhD. He has been instrumental in just helping me stay on track. Whenever I do have a question that I can go for it, go to him, for sure.

Roberto Soto: 14:09 Recently, the two people that have been very influential and mentors have been Bill [Bellaz 00:14:17] at the University of Arizona. He's retired now, but that's where he was at. And then [Lena Noronya 00:14:21] at Cal State Northridge, also retired. The work that they've done in helping underrepresented students is inspiring to me. And anytime I do have questions, I learned from both of them how to mentor students, how to apply for funding, and how to navigate the system in a way. So the three of them have been really, to me, mentors.

Roberto Soto: 14:44 And then another person that I look up to and I've talked to quite a bit, and she's actually younger than I am I think, but right now she's just on fire. It's a Pamela Harris at Williams college. I think the work that she does with her students, the work that she does for faculty of color, is inspiring to me. Again, sometimes when I have questions about how do I write a grant, or how do I make this proposal, she's been there to help me along the way. She's only, I think, a few years removed from me from graduating from a PhD, but she has done so much.

Roberto Soto: 15:20 These are the people I look up to, I look to in mentorship, and I ask questions. Finally there's individuals at Cal State. One of the reasons I chose Cal State Fullerton actually... Well, when they offered me the job, so I applied there, but when they offered me the job, one of the reasons I chose to go there was because I felt the same feeling I felt at Iowa. I think the same welcoming feeling that Iowa had for me.

Roberto Soto: 15:47 I realized that most of it is because the senior faculty there are mentors for all of us. They've really done a good job of just helping us through our tenure process and just learning the ropes of what it means to be a mathematician at a university like Cal State Fullerton. I have to thank them too because they've been very helpful in navigating this part, how to balance research, teaching, and service. It's been a really good environment for me.

Evelyn Lamb: 16:18 Now that you do probably a lot of mentoring yourself, or not probably, you've said already that you do a lot of mentoring, what are some of the things you try to keep in mind maybe that from being mentored that you try to bring to the people you are mentoring?

Roberto Soto:	16:37	What I try to keep in mind is that, well, first of all I don't have all the answers and sometimes I don't need to. That the most important skill I have is that I can listen. I think when I did go to Phil and talk to him, he would listen to me and just hear me out. Let me go through the process.
Roberto Soto:	16:56	In fact one time I think he said something that I found very interesting, but I think it's very true. He said, "Roberto, you already know what you're going to do. You just want to come here and talk to me just to get affirmation. But you've already thought this through and I think you've already made a decision." And he was right.
Roberto Soto:	17:17	I try to remember this when I'm working with my students is that in a way they've already have an answer, they already have an idea, and they're they're coming to me just to see, or just to help them see maybe consequences of their ideas. But at the end of the day, they already have an idea of what they want to do. So, the first lesson is just I need to listen to them.
Roberto Soto:	17:37	The second lesson to me is that one thing that Phil does very well is he advocates for students that maybe don't know how the system works. Whenever we would come to him with a problem that was beyond our capacity to handle, he would pick up the phone right then and there and just call and find out what was the best way to approach in solving any problems or any challenges. I keep that in mind too, that as my students come to me and when there is a problem that they find that they can't work through yet, they don't know how to do stuff, I pick up the phone, or right then and there, I let them pick up the phone. Because sometimes it is good for my students, I feel to learn how to handle the problem themselves.
Roberto Soto:	18:21	So while I'm in the office, I'll let them write the email, or make the phone call, or think about how they're going to talk to someone. I think that these are some of the lessons that I've learned, at least from the other mentoring that I do. But I definitely do think that trying to know my students is the first step in trying to mentor them and then after that, it's just about helping them get to where they want to go, whatever that place is.
Evelyn Lamb:	18:51	Well, thanks a lot for taking the time to talk with me.
Roberto Soto:	18:55	Thank you for having me on here. It's been a pleasure.

Evelyn Lamb:	19:00	Thank you for listening to the Lathisms Podcast. It's produced by me, Evelyn Lamb, and made possible by a Tensor-SUMMA Grant from the Mathematical Association of America.
Evelyn Lamb:	19:10	Our music is [foreign language 00:19:12]. Lathisms is an initiative to celebrate the accomplishments of Hispanic and Latinx mathematicians. It was founded in 2016 by Alexander Diaz-Lopez, Camella Harris, Alicia Prieto Langarica, and Gabrielle Sosa.
Evelyn Lamb:	19:27	You can find more information about the project at lathisms.org. That's L-A-T-H-I-S-M-S dot O-R-G. Join us next time to hear from another inspiring mathematician.