JOE MCGONEGAL: This is the MIT Alumni Books Podcast. I'm Joe McGonegal, Director of Alumni Education. My guest, Jim Henle, Ph.D. '76, is the Myra M. Sampson Professor of the Department of Mathematics and Statistics and at the Logic Program at Smith College.

Thought he's published for his share of academic journals and presses, Henle's new book, the proof in the pudding due out this spring by Princeton University Press, is his first foray into cookbooks. A self-described doodler with noodles, Henle clearly loves cooking as much as he loves logic.

Along with sharing his favorite recipes, Henle allows himself some profound observations about raising a family, managing stress, and forever aiming for perfection. I interviewed Henle this month, and I asked him why he took on this subject now.

JIM HENLE: Well, I decided to write it about 20 years ago. It's been a long time in the process. And I found it difficult in part, because I had so many ideas, and really, too many ideas to fit in the book. And so I guess part of it was writing and part of it was talking to people, and part of it was cooking and part of it was playing around with puzzles. But part of it was throwing stuff out that got in the way of the most important messages and setting other things aside for the next book, whatever that is.

MCGONEGAL: You're teaching at the same time. You're researching. This was a side project in the works for a long time?

HENLE: Well, yes, except that you know, teaching and projects are really part of the whole thing. I mean, I'm always thinking about how do I bring mathematics to people. And what is it that gets in the way of students connecting with mathematics? In some sense, this book is an answer to that, or my answer, or one answer to that.

MCGONEGAL: You seem to do a lot of defending of mathematics as fun in this book. I don't know if it's a result of bad teaching over the years or standardized testing, but what's driven the fun, in your opinion, out of the classroom?

HENLE: I think students naturally think of mathematics as fun when they first start out, and it's school that gets in the way. It's school and the demands that students pass tests, the demands that students figure out the answer that's in the teacher's head rather than what makes sense to them. And it's-- fun was taken out an early age, and it has to go back in. I think fun this is

critical.

This is my serious point here. It's critical. You have to have fun. If you don't have fun, you're going to stay in math as long as people make you and no longer.

MCGONEGAL: I wonder if you could read this excerpt. At the beginning of Chapter 2, you make this comparison between I can't bake bread and I can't do math. That drives your point home.

HENLE: I sometimes hear people say, I can't bake bread. The way they say it is familiar to me. The words are different, but the tone is the same-- I can't do math.

The confessions are similar, and similarly sad. They're not about weakness. They're about anxiety. In truth, everyone can do math, and everyone can bake bread. Both acts are exercises in problem solving. The remarkable fact is that the best method for solving math problems is also the best method for solving problems in the kitchen.

MCGONEGAL: Back to that notion of fun, has college gotten too serious?

HENLE: Well, definitely. And the threat of having exit exams or having national standards for college education, I think is threatening to the whole idea of fun.

Now, if you think about how well we have done or not done with elementary education, secondary education, I think you have to really praise colleges for cleaning up the messes. Most community colleges spend a lot of time helping students get to the point where they can actually be college students. College is doing a lot of right things, and tamper with it at your peril.

MCGONEGAL: Did you run into many obstacles in the editing process or in the publishing of this book?

HENLE: I think I had trouble-- I had trouble getting it adopted, but that might have been my fault. That is, every time somebody said, well, nice book, but I don't see a market for it and I'm not quite sold on it, reflected problems that I still had in trying to conceptualize this book, because it really is a very different sort of book. In the end, I pared it down and somebody liked it, liked it a lot. And so that's nice to hear and that worked.

MCGONEGAL: You say, ironically, that the fraction of people cooking today is smaller than it was 40 or 50 years ago. At the same time, you say the math preparedness of adults entering the workforce is seen as lower, too.

HENLE: It's true that students' algebraic skills, computational skills are lower than they used to be. They don't have to be quite so good anymore, because we have calculators. But I think the students are just as good for what I have to do with them, which is teach them calculus and then bring them to the math major, and perhaps even better. And the reason is not because they know more, it's because they're a better problem solvers. And they've better problem solvers because they've been messing around with technology for so long.

The most important thing you need to know about solving problems is you have to be unafraid of failure. You've got to just jump in and try something. Well, these kids can deal with software the way that we can't, that older folks have trouble with. You know, we see the screen and we don't know what to do, so we don't do anything. They see the screen, they don't know what to do, so they do something. And if that doesn't work, they'll try something else. And then if they mess things up, they'll reboot and try something else.

That's so important, and so important if they can transfer that problem solving technique to other areas of mathematics, of cooking, of any field they want to go into. Then they're golden.

MCGONEGAL: Like the motto of Silicon Valley, of quick, productive failure. That seems to be true of management, as well. Is that going to be the next book?

HENLE: It may be on mathematics as art. That's what kept creeping into this book.

MCGONEGAL: You're critical at times, very subtly critical of these three ingredient books that have ingredients with ingredients. And there's such great parallelism with that in math, isn't there?

HENLE: Oh yes, oh yes. Because in math, it's very important that we prove things. And if you're going to prove things, you have to have confidence in the tools you're using to prove those things. But if those tools are actually theorems that somebody else proved, well then, it's partly your responsibility to make sure that those theorems are true and that you're using them properly, and so on.

And the same thing is true in cooking. If you see a recipe that calls for ketchup, you must worry a little bit about what's going on into that ketchup, because if you use different ketchups it's going to come out differently. Or are you outsourcing this recipe, or are you cooking it yourself?

It's fun sometimes to make those ingredients. I've made ketchup via an old Joy of Cooking

recipe. And as a logician, I have proven-- I've started with axioms for arithmetic and proven all the theorems of arithmetic that I need to go on further. That's kind of fun, and it's fun to make students go through it. And they enjoy that, too.

MCGONEGAL: Talk about your MIT education. How is that alive and well in the book, or evident, at least?

HENLE: Well, I had a great time here and I had a lot of fun. I was in a group of about seven or eight students, all of this one faculty member who left pretty soon after I left. And we were all friends. We were working together. We were supporting each other. It was a wonderful collaborative experience, and I think maybe my first real collaborative experience in mathematics. And it showed me how much power there is in that.

MCGONEGAL: What about current MIT people? Who do you follow in mathematics or logic or otherwise, that you think are doing important work in this field?

HENLE: Well, I haven't been paying attention. I haven't been paying attention, and it's not just MIT. I look for stuff that interests me, and I jump in and play with it. You know, I have tenure I've been promoted. I don't need to do anything. I can just have fun, and that's really what the Academy is all about. That's what college, that's what university life is all about. It's letting your mind go where it wants to go.

MCGONEGAL: What else are you reading right now?

HENLE: I guess I'm in the middle of reading *A Year in the Life of Shakespeare.* It has nothing to do with math or cooking, but it's fun.

I'm a logician. I was in mathematical logic at MIT, and I see a lot of logic in Shakespeare, especially in some of the sonnets. And I've got theories. Let's leave it at that.

MCGONEGAL: Can you leave your fellow alumni with a puzzle, either out of the book that you love or a challenge you can throw out to them?

HENLE: Well, there's a chapter on what I call clueless Sudoku. And these are puzzles that are Sudoku-like, but there are no numerical clues. You don't see any numbers when you see the puzzle. So a typical clueless Sudoku would have a square that's divided into funny looking regions, and you're supposed to put the numbers 1 through n, whatever n is the size of the square, in each row and each column. But the additional clue is that the sum of the numbers in each region has to be the same. And you kind of have to look at them to see what's going on.

But I like the elegance of not seeing numbers in the puzzle but numbers appear in the answer. And my favorite of these puzzles, which I think is just beautiful, is a little four by four. Maybe you can show it. It's a beautiful-- it's a four by four, and there are just two regions, and you're told the sum of the numbers in each region comes out the same.

MCGONEGAL: Jim Henle's new book, *The Proof in the Pudding,* is now available online or at your favorite local bookstore. Jim Henle, thank you for joining me.

HENLE: Oh, pleasure to be here.