



# BAMA

School Year 2009–2010  
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## Bruce Reznick

### *What Does “>” Really Mean?*



San Jose State University\*  
Engineering Auditorium, Rm. 189

7:30 pm  
Wednesday, January 6

Mathematicians seek the truest and most general essence of the objects of their study. More than 100 years ago, the German mathematician David Hilbert wanted to understand what " $a > b$ " means for two numbers  $a$  and  $b$ . Let's be specific and ask the question: "Is  $\sqrt{2} > 0$ ?"

It turns out that there are situations in which the correct answer is "yes", situations in which the correct answer is "maybe" and situations in which the correct answer is "no", although in those cases, " $a > b$ " is never true for any  $a$  and  $b$ , and neither is " $b > a$ "! The correct answer turns out to depend on the set of other numbers to which  $\sqrt{2}$  can be compared.

To understand what ">" really means, we have to look at fields: sets of numbers which are "closed" under the usual arithmetic operations. This talk will be a listener-friendly introduction to what's called "Artin's theory of ordered fields" in grad school. Numbers of various kinds and polynomials will show up.

***Bruce Reznick*** always wanted to be a mathematician. He was raised in New York City and Los Angeles, was an undergraduate at Caltech and got his Ph.D. at Stanford.

He has been on the faculty of the Mathematics Department at the University of Illinois at Urbana-Champaign since 1979. He was on two of Caltech's 1st Place Putnam Teams in the early 1970's and helped write the Putnam in the early 1980s and the AIME more recently. Last spring, he received the UIUC Campus Award for Excellence in Undergraduate Teaching. He has supervised five PhD dissertations and written more than fifty research papers, usually on combinatorial problems in number theory, analysis, algebra and geometry, and polynomials usually show up.

In his spare time, he does math, reads, listens to music and watches the Chicago Cubs lose. He is not sure what he will be when he grows up.



\* See back for map and directions.

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