

The World of Mathematics and Statistics

SWARTHMORE COLLEGE • DEPARTMENT OF MATHEMATICS AND STATISTICS • COLLOQUIUM SERIES 2018–2019

Kaori Kitao Lecture

Categorifying cardinal arithmetic

In this interactive talk we'll prove, with help from the audience, the distributivity of multiplication over addition — $a \times (b + c) = a \times b + a \times c$ — not via the usual methods but by diving deeper into the question of what numbers really mean. The first deep idea is categorification, where we understand numbers as describing the “cardinalities”, or sizes, of sets. The second step involves the Yoneda lemma, which tells us that any set can be characterized by the collection of functions for which it serves as the domain. The third deep idea describes operations $+$ and \times on sets via their universal properties, by characterizing the functions whose inputs are drawn from the sets so-constructed. The final step involves the notion of adjunction, in this case an operation known as “currying” in computer science. In an epilogue, we will discover that the proof just described applies in vastly more general contexts.



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Tuesday, October 9, 2018
SC 199, Refreshments 4:15pm, Lecture 4:30pm