

MSCS MESS

Department of Mathematics, Statistics, and Computer Science
St. Olaf College, Northfield, MN 55057
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Next Monday's Colloquium

Title: Iteration of Differentiation
Speaker: David Walmsley
Time: 3:30 PM
Date: February 18
Place: RNS 310

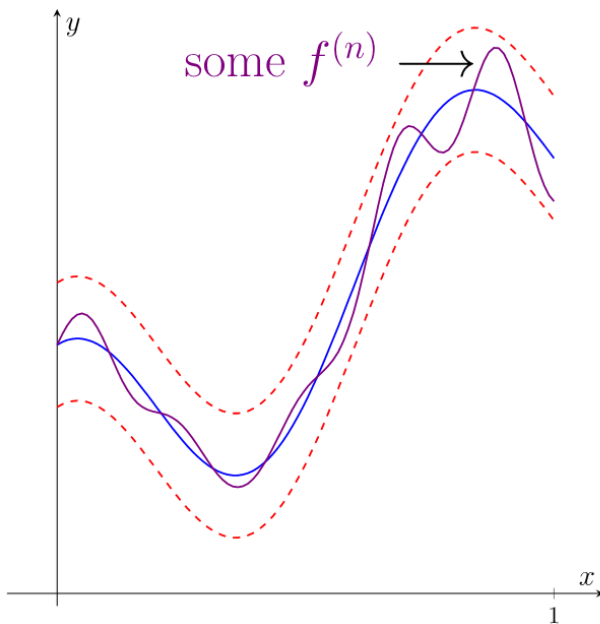


Figure 1: For any continuous g and error (in red), there is some derivative of f within the error bars.

About the talk: Imagine taking your favorite function from Calculus and repeatedly taking its derivative, creating a sequence of its derivatives. What kind of sequences can you see? Sometimes the sequence has a repeating pattern, like for the sine function, where the pattern repeats after 4 derivatives are taken. If you start with a polynomial like x^2 , after you take enough derivatives, you will keep getting the zero function. It turns out there is a function f with the following amazing

property: its derivatives can be used to approximate any continuous function on the unit interval!

In some sense, the function f carries the information for all of the continuous functions, and the way to unlock that information is to keep taking the derivative of f . In this talk, we'll discuss how to construct such a *hypercyclic function* for the derivative operator, and in doing so will introduce you to the vibrant research of linear dynamics.

About the Speaker: Dave went to college at St. John's University near his hometown of St. Cloud, Minnesota. He finished his graduate work at Bowling Green State University in 2017 and has been at St. Olaf since. He is a pizza enthusiast, amateur hiker, and at one point was a sponsored Halo:CE player. Answering the question "why," frequently asked by his young nieces, happily occupies most of his free time.

Next Tuesday's Research Seminar

Title: The Hypercyclicity Criterion
Speaker: David Walmsley
Time: 3:30 PM
Date: February 19
Place: RNS 204

About the Talk: It is a remarkable fact that every continuous function on the unit interval can be approximated by certain derivatives of a single function. In this follow-up talk to Monday's colloquium, we will switch gears to the complex variable setting and re-introduce the notion of hypercyclicity for a continuous linear operator on a space of analytic functions. We will discuss a sufficient condition that can be used to show when the phenomenon of hypercyclicity occurs, as well as recent work on what form certain hypercyclic functions can have.

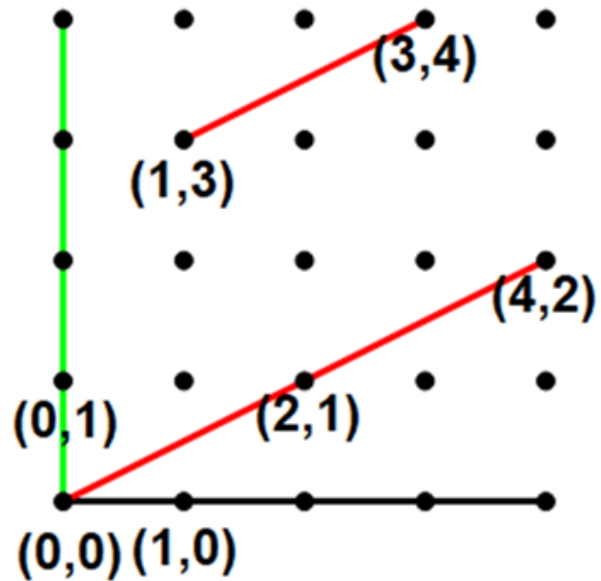
Next Friday's Research Seminar

Title: Mathematical MODifications
Speaker: Tom Sibley ('73)
Time: 3:30 PM
Date: February 22
Place: RNS 204

About the Talk: Euler started the study of modular arithmetic over 250 years ago. Since then the integers (mod n), written \mathbb{Z}_n , have become staples in abstract algebra and other areas of mathematics. Can there be anything new about these well explored systems? A number of my students have found new and interesting mathematics based on them. We'll start by looking at Pythagorean triples in \mathbb{Z}_n , investigated by some of my first-year students. We'll also look at probability questions about groups built from the \mathbb{Z}_n , developed by several of my upper division mathematics majors. Finding new mathematics often depends on looking at familiar things in new ways.

About the Speaker: After graduating from St. Olaf's Paracollege in 1973, Tom became a Peace Corps Volunteer, teaching high school mathematics (in French) in the D. R. Congo. Then

he found his calling to teach, but on the college level. He earned his Ph.D. from Boston University in 1980 and was hired by Cuttington University in Liberia. He has taught at St. John's University and the College of St. Benedict since 1984. His research interests center around geometry and group theory.



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