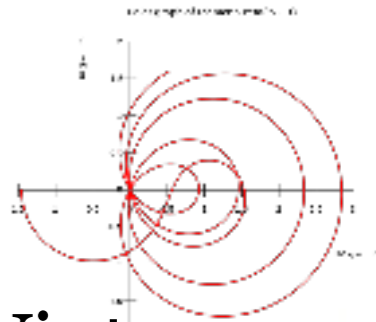# Michigan Math Club

Meeting [virtually](#) for Winter 2021
Thursdays at 4pm EDT

An Introduction to Markov Chains
Karl Godard

In this talk, we will build a foundational understanding of Markov Chains, a topic with both great mathematical depth as well as crucial application into fields such as machine learning, queueing theory, and bioinformatics. We will begin with the definition of a Markov Chain and proceed to analyze important properties, explore real world examples, and demonstrate how linear algebra can help us gain insight into a Markov Chain's long-term behavior.
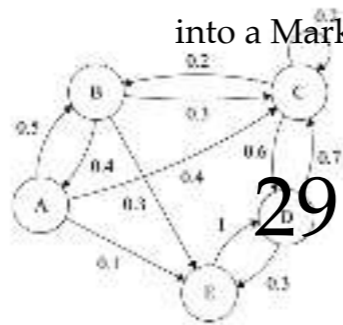
Mentor: Ryan Kohl

29 April 2021

The Stokes' Theorem that Calc III Doesn't Teach You
Xuyan Liu

In this talk, we will use Stokes' theorem as a motivation to introduce differential forms. We will define the basic notions of tangent spaces, multilinear forms, differential (alternating) forms, exterior derivative, and integration of a differential form. Finally, we will explicate the link between FTC, Stokes' theorem and Divergence theorem in this new context. Our goal is to provide a convincing argument about the usefulness of differential forms in integration and in generalizing familiar theorems from CalcIII, assuming minimal prerequisites.

Mentor: Reebhu Bhattacharyya
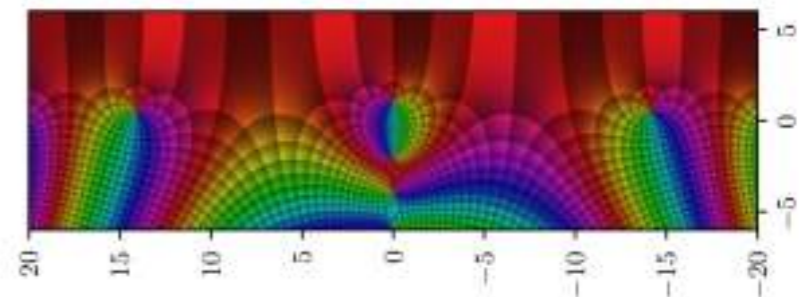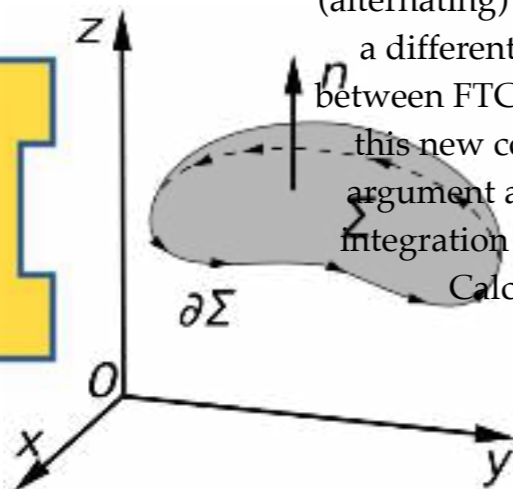
Directed Reading Program Presentations

The Prime Number Theorem and the Riemann Zeta Function
Neel Moudgal

In our digital age, prime numbers have become exceedingly important. For example, modern public-key encryption is based on finding prime factorizations for large numbers. For millennia, mathematicians have researched prime numbers and more recently, have been asking questions about the distribution of primes. The Prime Number Theorem, first proved by Hadamard and Poussin in 1896, provides a simple answer to this question and gives a formula for the asymptotic distribution of primes. In proving the theorem, both Hadamard and Poussin invoked ideas from Complex Analysis and made use of facts about the Riemann Zeta Function. In this talk, we shall see the Prime Number Theorem and an outline of its proof using the Zeta Function

Mentor: Patrick Kelley