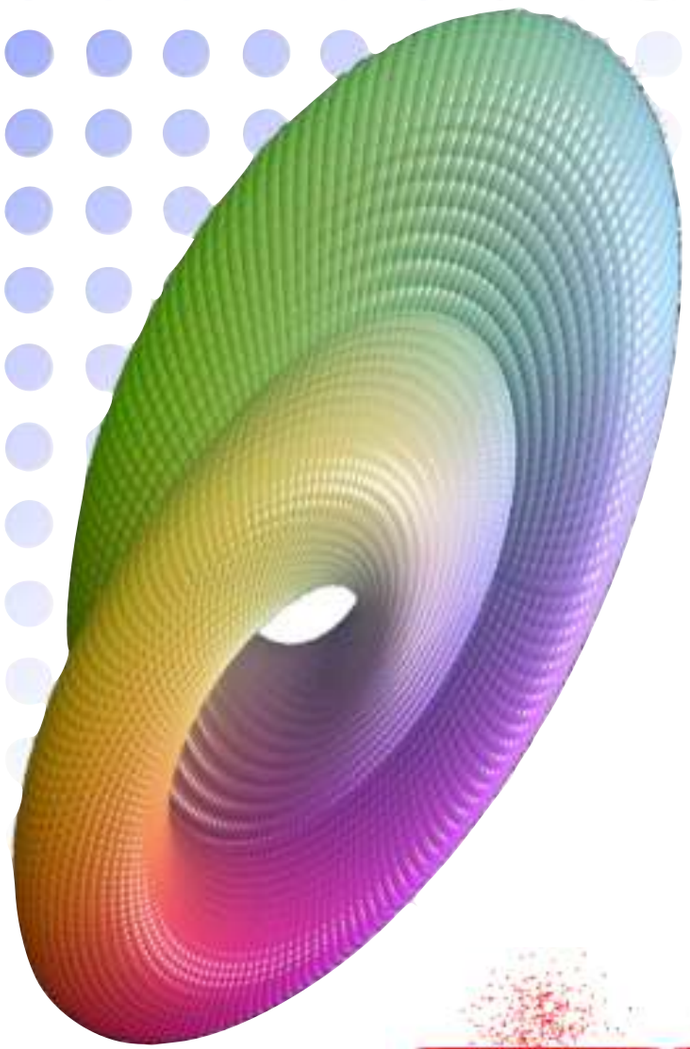
Michigan Math Club

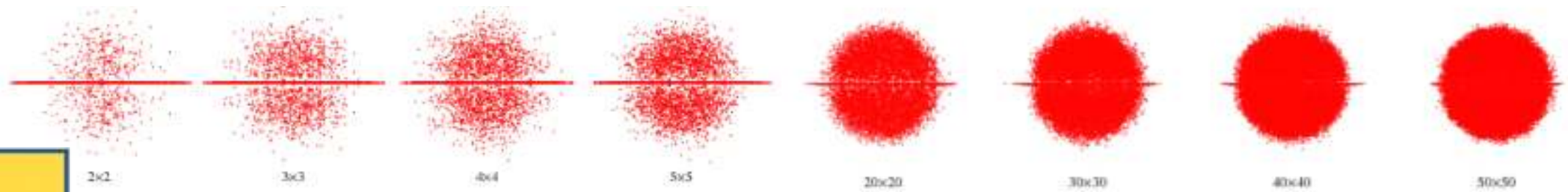
Thursday at 4pm in the Nesbitt Room
Free Pizza and Pop



Some statistics in linear algebra

Gilyoung Cheong • 25 October 2018

Just as we can think about matrices over real or complex numbers, we can think about $n \times n$ matrices over a finite number system called a "finite field". There are only finitely many such matrices because we have finitely many choices for each entry. Then we can ask a million interesting questions such as "How many $n \times n$ matrices has the property X?", or equivalently, we can ask, "What is the probability that a random $n \times n$ matrix has the property X?"



In this short talk, I will introduce you a generating function that helps computing this probability for invertible matrices satisfying a certain property about their eigenvalues. With some more work, one can compute the limit of this probability as n goes to infinity, and it turns out that the answer matches a famous probability given by Henri Cohen and Hendrick Lenstra arising from a difficult question in number theory. (The observation is due to Johannes Lengler.) If time permits, I will vaguely tell you why this is happening, although this is my work in progress.