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Session I

5:00-5:12

Brian Tinger, Worcester State College

Title: Subgraphs of a Complete Graph

Abstract: A Complete Graph is a graph in which every vertex is connected to every other vertex by exactly one edge. Any graph that is a partial graph of another graph is considered a subgraph of the larger graph. In this talk, I will show how I used combinations to derive the following formula which describes the total number of

subgraphs in a complete graph having n vertices:
$$\sum_{i=0}^n \left[\binom{n}{i} 2^{\frac{i(i-1)}{2}} \right]$$

5:15-5:27

Akie Hashimoto, Saint Michael's College

Title: Building Graphical Complexes from DNA

Abstract: DNA sequences are built out of two strands, which are made of four nucleic acids. Scientists discover bigger molecules by bonding smaller molecules with its attached single strands of DNA. The smaller molecules are going to self-assemble into larger molecules by bonding the complementary single strands of DNA. We are going to find a way to model the molecules as a graph problem and determine how many smaller molecules and single strands are needed to build different target graphs.

5:30-5:42

Kameron Decker Harris, University of Vermont

Title: Forecasting in a Chaotic Toy Climate

Abstract: We are building a toy climate analogous to the famous Lorenz system, against which we will test new climate modeling techniques. In particular, new methods of data assimilation and ensemble forecasting will be used to improve the predictive capability of computational models. Our goal is to accurately predict so-called regime changes in this toy climate. While this has recently been accomplished numerically, it has yet to occur for the physical analog of Lorenz' system.

5:45-5:57

Eva Ellis-Monaghan, Villanova University

Title: The Potts and Ising Models of Statistical Mechanics

Abstract: The Potts model and its special case the Ising model are widely used in statistical mechanics. I will define both models and address their Hamiltonian as the energy in a state and their partition function as the critical function in determining the probability of a particular state. Delving into the special case of the Ising model and its application in ferromagnets, I will describe the transfer matrix and its use as a means of deriving the Ising model's partition function.