Mathematics, Statistics, and Computer Science **@ UIC**

Thesis Defense

Model theory and the Lotka-Volterra system

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Abstract: The Lotka-Volterra system is a system of two first-order differential equations. It was first discovered independently by Lotka and Volterra as a model for the quantities of prey and predator species in an environment. Viewed as a definable set in the theory of differentially closed fields of characteristic zero, a natural question to ask is that whether this definable set is strongly minimal. This question is related to the historical problem, going back to Painlevé, of finding "new" functions, where the "known" functions include elementary functions, Liouvillian functions and even functions satisfies some order one differential equations. After establishing the strong minimality of the system, we use the trichotomy theorem and follow the literature on classifying algebraic dependencies among solutions to the system to resolve this question in our case.

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