Graduate Talk

SEARCHING FOR THE SHORTEST NETWORK

There are many situations in which one would like to connect a collection of points in some metric space by a network having the minimum possible total length. Such problems have a long and distinguished history, and occur in such areas as the design and analysis of telecommunications networks, oil pipe- line networks, and heating and air-conditioning duct systems, algorithms for molecular phylogenetics, and the layout of circuits on VLSI chips, to name a few. In this talk, we survey what is known and what is not known about this problem, and how it has been impacted by current developments in theoretical computer science.

Colloquium I

EUCLIDEAN RAMSEY THEORY

Ramsey theory is a branch of combinatorics that deals with unavoidable regularity. It's basic philosophy can be captured by the statement: "Complete disorder is impossible". In this talk, we summarize what is known about various geometric problems of this type, and where further progress remains to be made.

Colloquium II

SPARSE SETS OF INTEGERS HITTING LINEAR FORMS

A fundamental question in combinatorial number theory asks for the smallest subset of $[1, 2, ..., N]$ which intersects every set of integers satisfying some given set of linear constraints. For example, what is the largest subset of $[1, 2, ..., N]$ which hits every set of the form $\{x, 2x, 3x : x$ a positive integer$\}$? In this talk, we describe a variety of problems and results of this general type.