

Hajnal-Szemerédi type theorems

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An equitable k -coloring of a graph is a proper k -coloring in which no two color classes differ in size by more than one. In 1970, Hajnal and Szemerédi proved that every graph with maximum degree less than k has an equitable k -coloring. This theorem is easily seen to be best possible: complete graphs, odd cycles and balanced complete bipartite graphs with odd sized parts are all not equitably k -colorable when k is the maximum degree. In 1994, Chen, Lih and Wu conjectured that these are the only connected graphs that are not equitably k -colorable and have maximum degree at most k . This conjecture is still open, but a few special cases have been proved.

In this talk, we will discuss an Ore-type result which implies the Chen-Lih-Wu conjecture for k -equitable colorings in graphs with $3k$ vertices as well as other results and conjectures related to the Hajnal-Szemerédi Theorem.

This is joint work with Alexandr Kostochka, H.A. Kierstead and Elyse Yeager.