

Constructive Lower Bounds in Hypergraph Ramsey Theory

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Abstract:

Ramsey Theory of graphs and hypergraphs has a deep history filled with some of the great mathematicians of the 20th century. One of the important problems in this field is: given an n -uniform hypergraph Ramsey number $r(k, h; n)$, how can we infer a lower bound on an $n+1$ -uniform hypergraph Ramsey number $r(j, f; n+1)$ where j and f are greater than or equal to k and h respectively. One of the beautiful early results in to this problem is credited to Erdos and Hanjel. The so called step up lemma says that if $r(k, h; n) = m$ then $r(k+1, h+1; n+1) > (2^m) - 1$. The limitation of this theorem is that it required n to be at least three. In this talk we will establish a bound using Ramsey numbers for 2-graphs to find lower bounds for 3-uniform graphs. We will also show how several basic theorems, used to establish lower bounds for 2-graph Ramsey numbers can be easily generalized to find r -uniform bounds.