

Arithmetic progressions and graph theoretic lemmas

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I am going to talk about some of my work and its connection and possible impact on the subsequent work of other mathematicians.

One such work is a result which shows that sufficiently dense sets of integers contain arbitrarily long arithmetic progressions. We will discuss three different approaches towards proving this statement; via combinatorics, ergodic theory and harmonic analysis. We will briefly discuss the absolutely fundamental result of Green and Tao, which states that the primes contain arbitrarily long arithmetic progression.

We are also going to discuss results from graph theory, namely the removal lemma for graphs and the regularity lemma for hypergraphs. We will mention some applications of these lemmas.

Another graph theoretic method to be discussed is the semi definite method. We will discuss some applications.

Finally, from the field of computer science, we are going to talk about derandomisation and the sorting network.