New upper bounds for Ramsey numbers

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Abstract

The Ramsey number $r(k, k)$ is the smallest natural number n such that, in any red and blue colouring of the edges of the complete graph on n vertices, we are guaranteed to find either a red K_k or a blue K_k. We prove a new general upper bound for these numbers, showing in particular that for any $r > 0$, there exists a constant C_r, such that

$$r(k, k) \leq \frac{C_r}{k^r} \binom{2k}{k}.$$

The proof of this theorem is an extension of the proof of the old upper bound, due to Thomason