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On the Ramsey-Turán number of finite graphs

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On the Ramsey-Turán number of finite graphs

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This contains some results of a joint work of P. Erdős, A. Hajnal, Vera T. Sós and E. Szemerédi

Let $$a_\ell = \begin{cases} \frac{1}{2}\frac{\ell-3}{\ell-1} & \text{if } \ell \text{ is odd} \\ \frac{1}{2}\frac{3\ell-10}{3\ell-4} & \text{if } \ell \text{ is even} \end{cases} \qquad \ell \geq 3 .$$

Assume $\ell \geq 3$, $k = [\frac{\ell}{2}]$. Define Arb (ℓ) as the set of those graphs $G = \langle V, E \rangle$ for which there are sets V_i, $0 \leq i \leq k$ such that $V = V_0 \cup \dots \cup V_k$, the subgraphs $G(V_i)$ spanned by the V_i are forests for $i < k$, $G(V_k)$ has no edge, and $V_k = \emptyset$ if ℓ is even.

<u>Theorem</u> $\forall \ell \geq 3$ $\forall \varepsilon > 0$ $\forall H \in \mathrm{Arb}(\ell)$ $\exists \delta > 0$ $\exists$ n_0 $\forall G = \langle V, E \rangle \in \mathrm{Arb}(\ell)$, $|V| = n > n_0$, $|E| \geq (1+\varepsilon) a_\ell n^2$ and $\alpha(G) \leq \delta n$ imply that $H \subset G$.

The result is best possible for $K_\ell \in \mathrm{Arb}(\ell)$.

The case $H = K_\ell$ is a variant of Turán's theorem for graphs G not containing a large independent set.

The general theorem is an Erdős-Stone type generalization of it.