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Connected graphs with a minimal number of edges

In this talk we will give a lower bound for the number of edges of a connected graph as a function of the stability number α and the covering number τ. More precisely we will show that

$$q(G) \geq \alpha(G) - c(G) + \Gamma\big(\alpha(G), \tau(G)\big),$$

where $c(G)$ is the number of connected components of G and

$$\Gamma(a,t) = \min\left\{ \sum_{i=1}^{a} \binom{z_i}{2} \;\middle|\; z_1 + \cdots + z_a = a + t \text{ and } z_i \geq 0 \,\forall\, i = 1, \ldots, a \right\},$$

for a and t two arbitrary natural numbers.

This result is a variant for connected graphs from a Turán's theorem for the minimal number of edges of a graph with fixed stability number and order. We will also discuss the generalization of this result for k-connected graphs with $k \geq 2$.