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Counting H-free graphs for bipartite H

For a graph H, the extremal or Turán number $\mathrm{ex}(n, H)$ is the maximum number of edges in a graph on n vertices containing no copy of H. For any H containing a cycle, it was conjectured by Erdős that the number $f_n(H)$ of H-free graphs on n vertices is $2^{(1+o(1))\mathrm{ex}(n,H)}$. This has long been known to be true for graphs with chromatic number $\chi(H) \geq 3$, but does not hold in general for bipartite H. It is instead conjectured that $f_n(H) = 2^{O(\mathrm{ex}(n,H))}$; to date, this has been shown for relatively few examples, and often with considerable difficulty. We prove this conjecture for any bipartite H that satisfies a conjecture of Erdős and Siminovits on the asymptotic behavior of $\mathrm{ex}(n, H)$. We also give an analogous result for r-partite r-uniform hypergraphs H. Joint work with Asaf Ferber and Wojciech Samotij.