Assorted Musings on the Dimension of Bipartite Graphs

Matt Noble

Department of Mathematics and Statistics, Middle Georgia State University, Macon, GA 31206,
`matthew.noble@mga.edu`

The concept of *graph dimension* is introduced in a classic article by Erdős, Harary, and Tutte. For a finite graph G, say that G is of dimension n, and write $\dim(G) = n$, if G can be represented as a unit-distance graph in $\mathbb{R}^n$ but not in $\mathbb{R}^{n-1}$. It is known that $\dim(G) \leq 2\chi(G)$, where $\chi(G)$ denotes the chromatic number of G. In this talk, we will consider the following question – given a positive integer k, for which n does there exist an arbitrarily large k-chromatic graph G which is critical of dimension n? Even in the case of $k = 2$, a full resolution of this question appears difficult.