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Resurrection – revisiting old problems

There are problems that themselves are perhaps rather unimportant but whose solutions require new approaches, new ideas, new theories. This talk is about three of these that have been haunting me for over twenty years.

- We invented the *injective chromatic number* in [2] and there are now many papers on the subject. But one of the original questions, also asked in [4] in a different context, remains.
- The ultimate independence ratio of a graph has been studied extensively and much is known. Still, one of the problems from [1] is still very much open.
- In [3] the *b-chromatic number* of a graph is defined and questions answered. But in spite of sporadic results, not much is known.

Bonus A problem I recently learnt from John Gimbel could fall in the same category, though we do not know, it is too young.

References

- [1] G. Hahn, P. Hell, S. Poljak, *On the ultimate independence ratio*, *European Journal of Combinatorics* **16** (1995), 253 – 261
- [2] G. Hahn, J. Kratochvíl, D. Sotteau, J. Širáň, *On injective colourings*, *Discrete Math.* **256** (2002), 179 – 192.
- [3] R. W. Irving, D. Manlove, *The b-chromatic number of a graph*, *Discrete Math.* **91** (1999), 127 – 141.
- [4] N. Linial, R. Meshulam, M. Tarsi, *Matroidal bijections between graphs*, *J. Combin. Theory Ser. B* **45** (1988), 31 – 44.