

Irreducibility in distinguishing colourings

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We investigate the role of the Axiom of Choice and its weaker forms in distinguishing and proper colourings. In particular, we formulate conditions equivalent to AC in terms of such colourings in both vertex and edge variants. Moreover, we study the notion of *irreducible* distinguishing colourings, i.e. distinguishing colourings such that no two non-empty classes of colours may be merged to obtain another distinguishing colourings. One may view such as distinguishing colourings for which no colour is abundant.