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# Edge-distinguishing index of a graph

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## Abstract

We introduce a concept of edge-distinguishing colourings of graphs. A closed neighbourhood of an edge  $e \in E(G)$  is a subgraph  $N[e]$  induced by the edge  $e$  and all the edges adjacent to it. We say that a colouring  $c : E(G) \rightarrow C$  distinguishes two edges  $e_1$  and  $e_2$  if there does not exist an isomorphism  $\varphi$  of  $N[e_1]$  onto  $N[e_2]$  such that  $\varphi(e_1) = e_2$ , and  $\varphi$  preserves colours of  $c$ . An edge-distinguishing index of a graph  $G$  is the minimum number  $\chi'_e(G)$  of colours in a proper colouring  $c : E(G) \rightarrow C$  which distinguishes every two distinct edges of  $G$ . Such a colouring is called edge-distinguishing. We determine edge-distinguishing index for cycles, paths and complete graphs.

*Keywords:* proper edge colouring, chromatic index, Eulerian tours in multigraphs

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