

# Rainbow numbers and rainbow connection

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## Abstract

In this talk we consider edge colourings of graphs. A subgraph  $H$  of a graph  $G$  is called *rainbow subgraph*, if all its edges are coloured distinct.

In the first part we will survey the computation of rainbow numbers. For given graphs  $G, H$  the rainbow number  $rb(G, H)$  is the smallest number  $m$  of colours such that if we colour the edges of  $G$  with at least  $m$  different colours, then there is always a totally multicoloured or rainbow copy of  $H$ . For various graph classes of  $H$  we will list the known rainbow numbers if  $G$  is the complete graph and report about recent progress on the computation of rainbow numbers. Finally, new results on the rainbow numbers  $rb(Q_n, Q_k)$  for the hypercube  $Q_n$  will be presented.

An edge-coloured graph  $G$  is called *rainbow connected* if any two vertices are connected by a path whose edges have distinct colours. This concept of rainbow connection in graphs was introduced by Chartrand et al.. The *rainbow connection number* of a connected graph  $G$ , denoted  $rc(G)$ , is the smallest number of colours that are needed in order to make  $G$  rainbow connected.

In the second part we will show several complexity results and present lower and upper bounds for  $rc(G)$ . We will discuss  $rc(G)$  for graphs with given minimum degree. Finally, we will present some recent Erdős-Gallai type results for  $rc(G)$ .