

# Counting rainbow colorings

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A rainbow coloring of an undirected graph  $G$  is an edge coloring such that every pair of vertices is connected by a path for which no two edges are colored alike. The rainbow polynomial  $\rho(G, x)$  counts the number of rainbow colorings of the graph  $G$  with  $x$  colors. An  $s$ -rainbow coloring is an edge coloring of  $G$  such that there exist rainbow paths from an arbitrary vertex  $s$  to all other vertices of  $G$ . We define the  $s$ -rainbow polynomial  $\rho(G; s, x)$  and present some results for this polynomial.