An Optimal Edge Coloring of Graphs Using a Given Set of Colors

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Let G be a graph with minimum degree $\delta(G)$. In any edge coloring of G and any $v \in V(G)$, let $s(v)$ denote the number of different colors which appear on the edges incident with v. It was proved that if $\delta(G) > 1$, then G has a $(\delta(G) - 1)$-edge-coloring (necessarily improper) in which all $\delta(G) - 1$ colors are represented at each vertex. We conjecture that if G is a graph and t is a positive integer, then the edges of G can be colored using t colors in which for each vertex v, $s(v) \geq \min(t, d(v) - 1)$. In this talk we show that the conjecture is true for $t \leq 3$. Also we show that if G is a bipartite graph and t is a positive integer, then all edges of G can be colored using t colores such that for each vertex v, $s(v) \geq \min(t, d(v))$.

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