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COLORING FRACTIONAL POWERS OF GRAPHS

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For $m, n \in \mathbb{N}$, the fractional power $G^{\frac{m}{n}}$ of a graph G is the mth power of the n-subdivision of G, where the n-subdivision is obtained by replacing each edge in G with a path of length n. It was conjectured by Iradmusa that if G is a connected graph with $\Delta(G) \geq 3$ and $1 < m < n$, then $\chi(G^{\frac{m}{n}}) = \omega(G^{\frac{m}{n}})$. Here we show that the conjecture does not hold in full generality by presenting a graph H for which $\chi(H^{\frac{3}{5}}) > \omega(H^{\frac{3}{5}})$. However, we prove that the conjecture is true if m is even. We also study the case when m is odd, obtaining a general upper bound $\chi(G^{\frac{m}{n}}) \leq \omega(G^{\frac{m}{n}}) + 2$ for graphs with $\Delta(G) \geq 4$.