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Bounds for online Ramsey numbers

ABSTRACT

The paper focuses on estimates of online Ramsey numbers. We prove, among other things, that if a graph G is not bipartite H is a connected graph, then $\tilde{r}(G,H) \geqslant \varphi v(H) + e(H) - 2\varphi + 1$. We also determine the exact values of $\tilde{r}(C_4, P_n)$. Furthermore, we present the (semi)potential method, which provides a way to estimate online Ramsey numbers, and we prove that it is universal. We also show that many known proofs concerning online Ramsey numbers can be expressed within the framework of this method.

Keywords: Builder-Painter game, online Ramsey number, games on graphs, potential function

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