Almost All Cop-win Graphs Have a Universal Vertex

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Abstract

Cops and Robbers is a vertex-pursuit game played on graphs which has received much recent attention. Graphs where one cop has a winning strategy, so-called *cop-win graphs*, were discovered in the early 1980's by Nowakowski and Winkler and independently by Quilliot. Since their introduction, the structure of cop-win graphs has been relatively well-understood. Cop-win graphs possess a vertex elimination ordering which characterizes such graphs.

We consider cop-win graphs in the binomial random graph $G(n, 1/2)$. We prove that almost all cop-win graphs contain a universal vertex. From this result, we derive that the asymptotic number of labelled cop-win graphs of order n is $(1 + o(1))n2^{n^2/2 - 3n/2 + 1}$.