An extension of Beineke to the Prototype Representation $P(3,1)$ and the infinite set of forbidden induced subgraphs

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This work considers path representations of graphs. Consider a host graph, H. A path representation $[H : r : q]$ of a target graph G is a labeling in which each vertex is assigned a unique path of length r found in H in such a way that if $uv \in E(G)$, then the P_r assigned to u and the P_r assigned to v have at least a P_q in common. Within this context, Beineke characterized the path representation in which the host tree is the complete graph on n vertices, $r = 2$ and $q = 1$, that is, $[K_n : 2 : 1]$. This study extends Beineke's results to $[K_n : 3 : 1]$ which we refer to as $P(3,1)$-representations. We prove that, unlike Beineke's finite set of nine (9), $P(3,1)$ has infinitely many forbidden subgraphs, and here we describe a way to build this class.

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