Characterization and Enumeration of 3-Regular Permutation Graphs

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A permutation graph is a graph that can be derived from a permutation, where the vertices correspond to letters of the permutation, and the edges represent inversions. We provide a construction to show that there are infinitely many connected $r$-regular permutation graphs for $r \geq 3$. We prove that all 3-regular permutation graphs arise from a similar construction. Finally, we enumerate all 3-regular permutation graphs on $n$ vertices.

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