

# **Asymptotic Enumeration of Acyclic Orientations on Complete Multi-Partite Graphs**

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We consider the number of acyclic orientations on a complete tripartite graph with equal part sizes. Letting the part size tend toward infinity, we obtain asymptotics for the number of acyclic orientations. Our methods consist of applying Analytic Combinatorics in Several Variables to a generating function obtained by Donald E. Knuth. We will also discuss future directions, where these same methods are promising for investigating unequal part sizes, multipartite graphs with more than three parts, as well as the more refined problem of asymptotic distribution of longest path length.

Keywords: Multipartite graph, Acyclic orientation, Asymptotics