

1135-16-2231

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Austin Holmes, Tennie Jacobson and Jared Johnson. *Determining algebras of Hasse graphs associated with the 600-cell.* Preliminary report.

We can construct a graded algebra associated to a directed Hasse graph of a regular polytope by taking the quotient of the free algebra on the set of edges of the graph by the relations given by equating two directed paths having the same initial and final vertices. Previous work has studied the finite Coxeter groups A_n , B_n , D_n , $I_2(p)$ and H_3 and their related polytopes. The current goal of our project is to determine the structure of a graded algebra, $A(\Gamma_{H_4})$, that is associated to the Hasse graph, Γ_{H_4} , obtained from the 600-cell. The symmetry group of the 600-cell, and thus the automorphism group of the graphs, is isomorphic to the H_4 Coxeter group. For each unique symmetry, we consider the Hasse subgraph consisting of fixed k -faces of the polytope under the action. From each Hasse subgraph, we determine the graded dimension of the related subalgebras of $A(\Gamma_{H_4})$ by counting the directed paths between each pair of levels in the graph. We have created programs to produce the generating functions that will in turn describe $A(\Gamma_{H_4})$ under the action of each symmetry class. This then allows us to describe the complete algebraic structure using representation theory. (Received September 25, 2017)