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**Ryan Kinser\*** (kinser@gmail.com). *Tree modules and counting polynomials for free algebras*. Preliminary report.

A tree module for a (finitely generated, associative) free algebra is one whose structure can be presented by a tree graph with directed, labeled edges. (One may also think of it as a quiver representation.) We present some tools for determining whether such a module is indecomposable based on the structure of the graph, and for determining when two such modules are isomorphic.

These are applied to count isomorphism classes of tree modules for small dimension  $d \leq 5$ . It turns out that the number of isoclasses is a polynomial in the number of generators  $g$  of the algebra. Furthermore, these are the same polynomials obtained by Rodriguez Villegas and Helleloid when counting certain representations of the same algebra over the finite field with  $q$  elements, then evaluating at  $q = 1$ .

We speculate on an extension of these observations to all quivers and dimension vectors, and possible relations to a conjecture of Kac on cell decompositions of moduli spaces of quiver representations. (Received July 30, 2011)