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John Eagon, Ezra Miller and Erika Ordog* (erika.ordog@duke.edu). *Lattice paths from Koszul double complexes.*

It has been an open problem since the 1960s to construct closed-form, canonical, combinatorial minimal free resolutions of arbitrary monomial ideals in polynomial rings. The sylvan resolution solves the problem, in characteristic 0 and almost all positive characteristics, using sums over lattice paths of combinatorial data from simplicial complexes, one simplicial complex for each lattice point. Abstractly, our solution constructs resolutions by splitting a deceptively simple double complex whose rows and columns are all Koszul complexes. The algebra of spectral sequences for this Koszul double complex translates into combinatorics of "chain-link fences", which reflect matroidal data – higher dimensional versions of spanning tree information – descending along lattice paths. (Received August 03, 2020)