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A Simplicial Matrix Tree Theorem

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Building upon the work of Kalai and Adin, I extend the concept of a spanning tree from graphs to abstract simplicial complexes. For all complexes K satsifying a mild technical condition, I show that the simplicial spanning trees of K can be enumerated using its Laplacian matrices, thus generalizing the matrix-tree theorem. As in the graphic case, replacing the Laplacian with a weighted analogue yields homological information about the simplicial spanning trees being counted. I find a nice expression for the resulting weighted tree enumerator of shifted complexes, by generalizing a formula for the Laplacian eigenvalues of a shifted complex to the weighted case.
