

Meeting: 1002, Pittsburgh, Pennsylvania, SS 8A, Special Session on Graph Polynomials

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Reconstructing (and not reconstructing) trees from probability data.

Let T be a rooted tree, i.e., a tree with a distinguished vertex. If each edge e has an independent probability p of surviving, then we let $f_k(p)$ be the probability that exactly k vertices will be reachable from the root. We show that the rooted tree can be uniquely reconstructed from the family of polynomials $\{f_k(p)\}$. When T has no distinguished vertex, we define another family of polynomials $g_k(p)$, where $g_k(p)$ is the probability that exactly k surviving edges can be successively pruned from T . In this case, the tree cannot be uniquely reconstructed. We give examples of non-isomorphic *caterpillars* having the same family of polynomials. These examples also show that it is not possible to reconstruct a tree from its *Tutte* polynomial. (Received September 13, 2004)