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All Graph Genus Distributions Are Log-Concave, and Related Conjectures.

In the *genus polynomial* $\Gamma_G(z)$ for a graph G , the coefficient of z^k is the number of different cellular embeddings of G in the surface S_k of genus k . It was conjectured in 1989 that all genus distributions are log-concave, which we have taken to calling the *LCGD Conjecture*. By a theorem of Newton, a real-rooted polynomial with non-negative coefficients is necessarily log-concave. Log-concavity of a sequence implies unimodality. There is a growing list of graph families whose genus polynomials have been proved to be log-concave, including some that have been proved to be real-rooted. There are examples of graphs whose genus polynomials are log-concave, but not real-rooted. In addition to the progress on the LCGD Conjecture itself, we also discuss the growing list of related conjectures and spinoff problems to be solved. (Received September 06, 2013)