

From Convexity in Graphs to Polynomial Rings

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Abstract : This paper introduced a graph polynomial relating convexity concepts. A graph polynomial is a polynomial representing a graph given some parameters. On the other hand, a subgraph H of a graph G is said to be convex in G if for every pair of vertices in H , every shortest path with these end-vertices lies entirely in H . We define the convex subgraph polynomial of a graph G to be the generating function of the sequence of the numbers of convex subgraphs of G of cardinalities ranging from zero to the order of G . This graph polynomial is monic since G itself is convex. The convex index which counts the number of convex subgraphs of G of all orders is just the evaluation of this polynomial at 1. Relationships relating algebraic properties of convex subgraphs polynomial with graph theoretic concepts are established.

Keywords : convex subgraph, convex index, generating function, polynomial ring

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