

# Hamming polynomials and their partial derivatives

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## Abstract

Hamming graphs are Cartesian products of complete graphs and partial Hamming graphs are their isometric subgraphs. The Hamming polynomial  $h(G)$  of a graph  $G$  is introduced as the Hamming subgraphs counting polynomial.  $K_k$ -derivates  $\partial_k G$  ( $k \geq 2$ ) of a partial Hamming graph are also introduced. It is proved that for a partial Hamming graph  $G$ ,  $\frac{\partial h(G)}{\partial x_k} = h(\partial_k G)$ . A couple of combinatorial identities involving the coefficients of the Hamming polynomials of Hamming graphs are also proven.

**Key words:** Hamming graph; Hamming polynomial; Partial Hamming graph; Combinatorial identity

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