THE RELATIONSHIP BETWEEN THE IDENTITIES OF MATRIX ALGEBRAS AND GRAPHS

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Abstract. Let F be a field of characteristic zero. In 1950, Amitsur and Levitzki established that the standard polynomial of degree 2n is a polynomial identity of the matrix algebra of order n over F. Afterwards, Swan provided a new and interesting proof for the Amitsur and Levitzki theorem. In this proof, Swan has established a close relationship between substitutions of unit matrices in the standard polynomial and unicursal paths in directed graphs, and thus translated the Amitsur and Levitzki theorem into a theorem inherent to graph theory. Next, several works were based on Swan's approach to studying the polynomial identities of matrix algebra in other contexts. In this talk, we will discuss this relationship and present some results on the study of the minimal degree of standard identities of matrix algebras with a graded involution.

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