# Aljadeff: Polynomial Identities and Graded Algebras

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10:41 AM

1. Representability & Specht Problems.
2. Asymptotic methods.
3. Generic Constructions (applications to division algebras & Braur group)

Char($\mathbb{F}$)=0 mostly $\mathbb{F}=\overline{\mathbb{F}}$

Then $G$-graded analogs of these results, $G$ a finite group.

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$W$ an associative algebra over $\mathbb{F}=\overline{\mathbb{F}}$

$f \in F\langle X \rangle$

$f(x_1 \dots x_n) \equiv 0$ for $\Rightarrow f$ is an identity.

Examples $xy - yx \Leftrightarrow W$ is commutative

$[[x,y]^2, z]$ in $M_2(\mathbb{F})$

Amitsur-Levitzky:

$$S_{2n} = \sum_{\sigma \in S_{2n}} (-1)^\sigma x_{\sigma 1} \cdots x_{\sigma(2n)}$$

in $M_n(\mathbb{F})$

A "PI-algebra" is an algebra that has identities.

"Multilinearization": Can always replace identities by multilinear ones.

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Cappeli: $C_n = \sum (-1)^\sigma y_0 x_{\sigma 1} y_1 x_{\sigma 2} \dots x_{\sigma n} y_n$

$\sigma \in S_n$

is an identity for any algebra of $\dim < n$

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Yet the infinite grassman algebra satisfies $[[x,y],z]$ but no Cappelli identity.

DBN: Is this related to "internal quotients"?