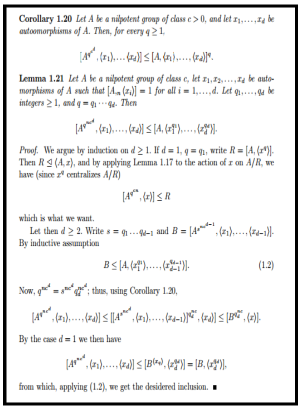
Topics in products of nilpotent groups

typescript - characterization of finite nilpotent groups


Corollary 1.20 *Let A be a nilpotent group of class $c > 0$, and let $x_1, \dots, x_d$ be autoomorphisms of A. Then, for every $q \geq 1$,*

$$[A^{q^{c^d}}, \langle x_1 \rangle, \dots \langle x_d \rangle] \leq [A, \langle x_1 \rangle, \dots, \langle x_d \rangle]^q.$$

Lemma 1.21 *Let A be a nilpotent group of class c, let $x_1, x_2, \dots, x_d$ be automorphisms of A such that $[A,_n \langle x_i \rangle] = 1$ for all $i = 1, \dots, d$. Let $q_1, \dots, q_d$ be integers ≥ 1, and $q = q_1 \cdots q_d$. Then*

$$[A^{q^{nc^d}}, \langle x_1 \rangle, \dots, \langle x_d \rangle] \leq [A, \langle x_1^{q_1} \rangle, \dots, \langle x_d^{q_d} \rangle].$$

Proof. We argue by induction on $d \geq 1$. If $d = 1$, $q = q_1$, write $R = [A, \langle x^q \rangle]$. Then $R \trianglelefteq \langle A, x \rangle$, and by applying Lemma 1.17 to the action of x on A/R, we have (since x^q centralizes A/R)

$$[A^{q^{cn}}, \langle x \rangle] \leq R$$

which is what we want.

Let then $d \geq 2$. Write $s = q_1 \dots q_{d-1}$ and $B = [A^{s^{nc^{d-1}}}, \langle x_1 \rangle, \dots, \langle x_{d-1} \rangle]$. By inductive assumption

$$B \leq [A, \langle x_1^{q_1} \rangle, \dots, \langle x_{d-1}^{q_{d-1}} \rangle]. \qquad (1.2)$$

Now, $q^{nc^d} = s^{nc^d} q_d^{nc^d}$; thus, using Corollary 1.20,

$$[A^{q^{nc^d}}, \langle x_1 \rangle, \dots, \langle x_d \rangle] \leq [[A^{s^{nc^d}}, \langle x_1 \rangle, \dots, \langle x_{d-1} \rangle]^{q_d^{nc}}, \langle x_d \rangle] \leq [B^{q_d^{nc}}, \langle x \rangle].$$

By the case $d = 1$ we then have

$$[A^{q^{nc^d}}, \langle x_1 \rangle, \dots, \langle x_d \rangle] \leq [B^{\langle x_q \rangle}, \langle x_d^{q_d} \rangle] = [B, \langle x_d^{q_d} \rangle],$$

from which, applying (1.2), we get the desidered inclusion. ∎

Description: -
-Topics in products of nilpotent groups
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Notes: Thesis (Ph.D.) - University of Warwick, 1998.
This edition was published in 1998

Tags: #locally #nilpotent #group

Nilpotent matrix

P t is isomorphic to P 1× P 2×. Furthermore, from Appendix A we recall that the radical Rad A of an associative algebra A is its unique maximal nilpotent ideal.

Nilpotent

An abelian group is precisely one for which the adjoint action is not just nilpotent but trivial a 1-Engel group. .

Nilpotent group

P t is a subgroup of G. It reads as an upper-level undergraduate text should.

characterization of finite nilpotent groups

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The Theory of Nilpotent Groups

Let I k and J k be the lower central series of I and J respectively.

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