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Groups of finite exponent

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The negative answer by Novikov and Adyan to the Burnside question (is every finitely generated group of finite exponent finite?) still leaves open some cases, in particular, all 2-power exponents. Some reduction results are known. In this note we present another kind of reduction result.

THEOREM. *Let* p *be a prime and* k *a positive integer. If every group of exponent* p^k *generated by elements of order* p *is locally finite, then every group of exponent* p^k *is locally finite.*

Once stated this is easy to prove. Yet in spite of reasonably wide enquiries we have been unable to find any knowledge of such a result.

Proof. We show by induction on i that, under the given hypothesis (which serves as the initial step), every group of exponent p^k generated by elements of order at most p^i is locally finite. Let G be a group of exponent p^k generated by a set X of elements of order at most p^i. Let Y be the set of conjugates of p^{i-1}-th powers of elements of X and N the (normal) subgroup of G generated by Y. Then N can be generated by a set of elements of order p and G/N by a set of elements of order at most p^{i-1}. Hence N and G/N are locally finite and the result follows.

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