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Autor: Serre, Jean-Pierre

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Sinopsis

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Lectures on $N_X(p)$ deals with the question on how $N_X(p)$, the number of solutions of mod p congruences, varies with p when the family (X) of polynomial equations is fixed. While such a general question cannot have a complete answer, it offers a good occasion for reviewing various techniques in l -adic cohomology and group representations, presented in a context that is appealing to specialists in number theory and algebraic geometry.

Along with covering open problems, the text examines the size and congruence properties of $N_X(p)$ and describes the ways in which it is computed, by closed formulae and/or using efficient computers.

The first four chapters cover the preliminaries and contain almost no proofs. After an overview of the main theorems on $N_X(p)$, the book offers simple, illustrative examples and discusses the Chebotarev density theorem, which is essential in studying Frobenian functions and Frobenian sets. It also reviews l -adic cohomology.

The author goes on to present results on group representations that are often difficult to find in the literature, such as the technique of computing Haar measures in a compact l -adic group by performing a similar computation in a real compact Lie group. These results are then used to discuss the possible relations between two different families of equations X and Y . The author also describes the Archimedean properties of $N_X(p)$, a topic on which much less is known than in the l -adic case. Following a chapter on the Sato-Tate conjecture and its concrete aspects, the book concludes with an account of the prime number theorem and the Chebotarev density theorem in higher dimensions.