Title: Countifiers

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Abstract:

Way back in 1929, Presburger gave an algorithm to check the validity of first order logic formulae about the ordered group of integers with addition FO[+]. Cooper improved Presburger's algorithm in 1972. Oppen (1978) showed that it runs in triply-exponential time. More recently Schweikardt (2005) showed that there is an algorithm to check validity of formulae in the counting extension FOC[+] of Presburger arithmetic, which has counting quantifier terms #zF, denoting the number of points z in a structure which satisfy formula F. In this talk we discuss this problem and its complexity. On the other hand, allowing points to be distinguished (say by finitely many colours) and restricting to just two variables, Graedel, Otto and Rosen (1997) showed there is no algorithm for checking validity of FO2C[+,Red,Blue,...]. We show that there is no algorithm for checking validity of FO2[+,Red,Blue,...] where we use the usual quantifiers. This is joint work with A.V.Sreejith.