PRIMES AND SQUARES WITH PREASSIGNED DIGITS

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ABSTRACT: Bourgain (2015) estimated the number of prime numbers with a positive proportion of preassigned digits in base 2. We first present a generalization of this result to any base $g \geq 2$. We then discuss a more recent result for the set of squares, which may be seen as one of the most interesting sets after primes. More precisely, for any base $g \geq 2$, we obtain an asymptotic formula for the number of squares with a proportion $c > 0$ of preassigned digits. Moreover we provide explicit admissible values for c depending on g. Our proof mainly follows the strategy developed by Bourgain for primes in base 2, with new difficulties for squares. It is based on the circle method and combines techniques from harmonic analysis together with arithmetic properties of squares and bounds for quadratic Weyl sums.

ELAZ 2022