

ROMANOV TYPE PROBLEMS

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ABSTRACT: An old result of Romanov states that a positive proportion of integers is of the form $p + g^k$ where p is a prime and $g \geq 2$ is an integer. We adapt the method of Romanov to show that a positive proportion of integers can be represented in the form $p + 2^{2^k} + m!$ and $p + 2^{2^k} + 2^q$ for p, q primes and k, m non-negative integers. Compared to Romanov's original work the addition of a third summand leads to new technical problems. Also, building on work of Erdős and van der Corput, we present results concerning the lower density of odd positive integers not of the form $p + 2^{2^k} + m!$ (and $p + 2^{2^k} + 2^q$ resp.). This is joint work with C. Elsholtz and F. Luca.