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On Erdős–Pomerance's conjecture for the Carlitz module

There are many sequences with integral values arisen naturally from number theory. The goal in this talk is to study their probabilistic properties. For example, for $a \in \mathbb{Z}$, $m \in \mathbb{N}$ with $(a, m) = 1$, let $l_a(m)$ be the order of a in $(\mathbb{Z}/m\mathbb{Z})^*$. Let $\omega\big(l_a(m)\big)$ be the number of distinct prime divisors of $l_a(m)$. A conjecture of Erdős and Pomerance states that if $|a| > 1$, then the quantity

$$\frac{\omega\big(l_a(m)\big) - \frac{1}{2}(\log\log m)^2}{\frac{1}{\sqrt{3}}(\log\log m)^{3/2}}$$

distributes normally. The problem remains open until today. A conditional proof of it was obtained recently by Murty and Saidak, and later Li and Pomerance provided an alternative proof. In this talk, we formulate an analogous question for the Carlitz module and provide an unconditional proof of it. Also, we will discuss other analogue of this problem.

This is a joint work with Y.-R. Liu