Counting points on curves and irreducible polynomials over finite fields.

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Abstract: The number of irreducible polynomials over a finite field was first counted by Gauss. We will explain a connection between counting the number of irreducible polynomials over $\mathbb{F}_q$ with certain properties, and the number of rational points on some related algebraic curves. This idea can be used to count the number of irreducible polynomials with certain coefficients being 0. The appearance of supersingular curves explains the interesting periodic behaviour in the formulae, and new formulae are also obtained.