1145-11-1532 **Michael J Seaman*** (`mseaman@caltech.edu`), 1200 E California Blvd, Pasadena, CA 91125. *A Formula for the Number of Monic Degree m Polynomials in $\mathbb{F}_q[x]$ with Discriminant d.*

We show a formula for the distribution of discriminants of monic polynomials over a finite field. For an odd prime power q, integer $m \geq 2$, and $d \in \mathbb{F}_q$, let $|V_d^m(\mathbb{F}_q)|$ be the number of monic polynomials in $\mathbb{F}_q[x]$ of degree m with discriminant d. We express $|V_d^m(\mathbb{F}_q)|$ as a discrete Fourier transform of Gauss sums, computable in polynomial time.

For $d \neq 0$, we show

$$|V_d^m(\mathbb{F}_q)| = \chi(d) \sum_{c=1}^{q-1} \frac{G_{\mathbb{F}_q}(c)^m \frac{qB_{m-1}(c) - B_m(c)}{q} \tau_q(-1)^{\frac{cm(m-1)}{2}} \tau_q(d)^c}{G_{\mathbb{F}_q}(cm)}$$

where τ_q is a multiplicative character of order $q-1$, ψ a nontrivial additive character, $G_{\mathbb{F}_q}(c)$ is the Gauss sum $G_{\mathbb{F}_q}(\tau_q^c, \psi)$, χ is the quadratic character, and

$$B_k(c) = \begin{cases} q^{\frac{k \gcd(c, q-1)}{q-1}}, & \text{if } (q-1) | ck \\ 0, & \text{otherwise} \end{cases}$$

For the discriminant, we compute the local L-functions, explicitly verify the Weil Conjectures, express the global L-function in terms of Hecke-characters, and deduce classical and new discriminant distribution results. (Received September 23, 2018)