1.) Let $X/\mathbb{F}_q$ be a smooth projective variety. Assume that there exists a polynomial $P \in \mathbb{C}[T]$, such that for all $r \geq 1$ we have

$$\#X(\mathbb{F}_{q^r}) = P(q^r).$$

Then, we have an equality

$$\sum_{i=0}^{2 \dim X} (\mathrm{rk}\, H^i_{\text{ét}}(\bar{X}, \mathbb{Q}_\ell)) T^i = P(T^2).$$

Due on Tuesday, December 4th