

ZSIGMONDY'S THEOREM

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Definition 1 (Multivariate Cyclotomic Polynomial). Let $\Phi_n \in \mathbb{Z}[x]$, define $\Phi_n \in \mathbb{Z}[x, y]$ as

$$\Phi_n(x, y) = y^{\varphi(n)} \Phi_n\left(\frac{x}{y}\right)$$