Polinomios ciclotómicos

$$\Phi_p = \frac{X^p - 1}{X - 1} = X^{p-1} + X^{p-2} + \cdots + X^2 + X + 1, \quad \Phi_{p^k} = \frac{X^{p^k} - 1}{X^{p^{k-1}} - 1} = \Phi_p(X^{p^{k-1}}), \quad \prod_{d|n} \Phi_d = X^n - 1.$$

$$\begin{aligned}
\Phi_1 &= X - 1, \quad \Phi_2 = X + 1, \quad \Phi_3 = X^2 + X + 1, \quad \Phi_4 = X^2 + 1,\\
\Phi_5 &= X^4 + X^3 + X^2 + X + 1,\\
\Phi_6 &= X^2 - X + 1,\\
\Phi_7 &= X^6 + X^5 + X^4 + X^3 + X^2 + X + 1,\\
\Phi_8 &= X^4 + 1,\\
\Phi_9 &= X^6 + X^3 + 1,\\
\Phi_{10} &= X^4 - X^3 + X^2 - X + 1,\\
\Phi_{11} &= X^{10} + X^9 + X^8 + X^7 + X^6 + X^5 + X^4 + X^3 + X^2 + X + 1,\\
\Phi_{12} &= X^4 - X^2 + 1,\\
\Phi_{13} &= X^{12} + X^{11} + X^{10} + X^9 + X^8 + X^7 + X^6 + X^5 + X^4 + X^3 + X^2 + X + 1,\\
\Phi_{14} &= X^6 - X^5 + X^4 - X^3 + X^2 - X + 1,\\
\Phi_{15} &= X^8 - X^7 + X^5 - X^4 + X^3 - X + 1,\\
\Phi_{16} &= X^8 + 1,\\
\Phi_{17} &= X^{16} + X^{15} + X^{14} + \cdots + X^3 + X^2 + X + 1,\\
\Phi_{18} &= X^6 - X^3 + 1,\\
\Phi_{19} &= X^{18} + X^{17} + X^{16} + \cdots + X^3 + X^2 + X + 1,\\
\Phi_{20} &= X^8 - X^6 + X^4 - X^2 + 1,\\
\Phi_{21} &= X^{12} - X^{11} + X^9 - X^8 + X^6 - X^4 + X^3 - X + 1,\\
\Phi_{22} &= X^{10} - X^9 + X^8 - X^7 + X^6 - X^5 + X^4 - X^3 + X^2 - X + 1,\\
\Phi_{23} &= X^{22} + X^{21} + X^{20} + \cdots + X^3 + X^2 + X + 1,\\
\Phi_{24} &= X^8 - X^4 + 1,\\
\Phi_{25} &= X^{20} + X^{15} + X^{10} + X^5 + 1,\\
\Phi_{26} &= X^{12} - X^{11} + X^{10} - X^9 + X^8 - X^7 + X^6 - X^5 + X^4 - X^3 + X^2 - X + 1,\\
\Phi_{27} &= X^{18} + X^9 + 1,\\
\Phi_{28} &= X^{12} - X^{10} + X^8 - X^6 + X^4 - X^2 + 1,\\
\Phi_{29} &= X^{28} + X^{27} + X^{26} + \cdots + X^3 + X^2 + X + 1,\\
\Phi_{30} &= X^8 + X^7 - X^5 - X^4 - X^3 + X + 1, \ \ldots
\end{aligned}$$

$$\begin{aligned}
\Phi_{105} = X^{48} &+ X^{47} + X^{46} - X^{43} - X^{42} - 2X^{41} - X^{40} - X^{39} + X^{36} + X^{35} + X^{34}\\
&+ X^{33} + X^{32} + X^{31} - X^{28} - X^{26} - X^{24} - X^{22} - X^{20} + X^{17} + X^{16} + X^{15}\\
&+ X^{14} + X^{13} + X^{12} - X^9 - X^8 - 2X^7 - X^6 - X^5 + X^2 + X + 1.
\end{aligned}$$