

4.7.2

$$\begin{aligned}
 (1) \quad \Phi_8(x) &= \frac{x^8 - 1}{\prod_{d|8, d < 8} \Phi_d(x)} \\
 &= \frac{x^8 - 1}{\Phi_1(x) \Phi_2(x) \Phi_4(x)} \\
 &= \frac{x^8 - 1}{\Phi_1(x) \Phi_2(x)} \cdot \frac{\Phi_2(x) \Phi_4(x)}{x^4 - 1} \\
 &= \frac{x^8 - 1}{x^4 - 1} \\
 &= x^4 + 1
 \end{aligned}$$

$$\begin{aligned}
 (2) \quad \Phi_9(x) &= \frac{x^9 - 1}{\Phi_3(x) \Phi_1(x)} \\
 &= \frac{x^9 - 1}{(x^2 + x + 1)(x - 1)} \\
 &= \frac{x^8 + x^7 + x^6 + x^5 + x^4 + x^3 + x^2 + x + 1}{x^4 + x + 1} \\
 &= x^4 + x^3 + 1
 \end{aligned}$$

(2) の定義通り
計算は数と科学計算機

$$\begin{aligned}
 (3) \quad \Phi_{10}(x) &= \frac{x^{10} - 1}{\Phi_1(x) \Phi_2(x) \Phi_5(x)} \\
 &= \frac{x^{10} - 1}{\Phi_1(x) \Phi_2(x)} \cdot \frac{\Phi_5(x)}{x^5 - 1} \\
 &= \frac{x^5 + 1}{\Phi_2(x)} \\
 &= \frac{x^5 + 1}{x + 1} \\
 &= x^4 - x^3 + x^2 - x + 1
 \end{aligned}$$

★
2/5 に一番大きい
Φ(10) = 4 (2, 5) の
63 一度 10 2 の
計算して
後で割ればよい
次数が低い方がよい

$$\begin{aligned}
 (4) \quad \Phi_{12}(x) &= \frac{x^{12} - 1}{\Phi_1(x) \Phi_2(x) \Phi_3(x) \Phi_4(x) \Phi_6(x)} \\
 &= \frac{x^{12} - 1}{\Phi_1(x) \Phi_2(x) \Phi_3(x) \Phi_4(x)} \cdot \frac{\Phi_6(x)}{x^6 - 1} \\
 &= \frac{x^6 - 1}{x^4 - 1} \cdot (x^2 - 1) \\
 &= \frac{x^6 - 1}{x^2 - 1} \\
 &= x^4 - x^2 + 1
 \end{aligned}$$