

**F[p_, n_] := (Print["Rozklad wielomianu ", x^(p^n), "-x w ", F_p];
TraditionalForm[Factor[x^(p^n) - x, Modulus -> p]])**

F[2, 2]

Rozklad wielomianu $x^4 - x$ w F_2

$$x(x+1)(x^2+x+1)$$

F[3, 2]

Rozklad wielomianu $x^9 - x$ w F_3

$$x(x+1)(x+2)(x^2+1)(x^2+x+2)(x^2+2x+2)$$

F[3, 3]

Rozklad wielomianu $x^{27} - x$ w F_3

$$x(x+1)(x+2)(x^3+2x+1)(x^3+2x+2)(x^3+x^2+2)(x^3+x^2+x+2)(x^3+x^2+2x+1)(x^3+2x^2+1)(x^3+2x^2+x+1)(x^3+2x^2+2x+2)$$

F[2, 4]

Rozklad wielomianu $x^{16} - x$ w F_2

$$x(x+1)(x^2+x+1)(x^4+x+1)(x^4+x^3+1)(x^4+x^3+x^2+x+1)$$

F[3, 4]

Rozklad wielomianu $x^{81} - x$ w F_3

$$x(x+1)(x+2)(x^2+1)(x^2+x+2)(x^2+2x+2)(x^4+x+2)(x^4+2x+2)(x^4+x^2+2)(x^4+x^2+x+1)(x^4+x^2+2x+1)(x^4+2x^2+2)(x^4+x^3+2)(x^4+x^3+2x+1)(x^4+x^3+x^2+1)(x^4+x^3+x^2+x+1)(x^4+x^3+x^2+2x+2)(x^4+x^3+2x^2+2x+2)(x^4+2x^3+2)(x^4+2x^3+x+1)(x^4+2x^3+x^2+1)(x^4+2x^3+x^2+x+2)(x^4+2x^3+2x+1)(x^4+2x^3+2x^2+x+2)$$

F[2, 6]

Rozklad wielomianu $x^{64} - x$ w F_2

$$x(x+1)(x^2+x+1)(x^3+x+1)(x^3+x^2+1)(x^6+x+1)(x^6+x^3+1)(x^6+x^4+x^2+x+1)(x^6+x^4+x^3+x+1)(x^6+x^5+1)(x^6+x^5+x^2+x+1)(x^6+x^5+x^3+x^2+1)(x^6+x^5+x^4+x+1)(x^6+x^5+x^4+x^2+1)$$

F[5, 2]

Rozklad wielomianu $x^{25} - x$ w F_5

$$x(x+1)(x+2)(x+3)(x+4)(x^2+2)(x^2+3)(x^2+x+1)(x^2+x+2)(x^2+2x+3)(x^2+2x+4)(x^2+3x+3)(x^2+3x+4)(x^2+4x+1)(x^2+4x+2)$$

F[7, 2]

Rozklad wielomianu $x^{49} - x$ w F_7

$$x(x+1)(x+2)(x+3)(x+4)(x+5)(x+6)(x^2+1)(x^2+2)(x^2+4)(x^2+x+3)(x^2+x+4)(x^2+x+6)(x^2+2x+2)(x^2+2x+3)(x^2+2x+5)(x^2+3x+1)(x^2+3x+5)(x^2+3x+6)(x^2+4x+1)(x^2+4x+5)(x^2+4x+6)(x^2+5x+2)(x^2+5x+3)(x^2+5x+5)(x^2+6x+3)(x^2+6x+4)(x^2+6x+6)$$

F[3, 6]Rozkład wielomianu $x^{729}-x$ w F_3

$$\begin{aligned}
& x(x+1)(x+2)(x^2+1)(x^2+x+2)(x^2+2x+2)(x^3+2x+1)(x^3+2x+2)(x^3+x^2+2)(x^3+x^2+x+2)(x^3+x^2+2x+1) \\
& (x^3+2x^2+1)(x^3+2x^2+x+1)(x^3+2x^2+2x+2)(x^6+x+2)(x^6+2x+2)(x^6+x^2+x+1)(x^6+x^2+2x+1) \\
& (x^6+2x^2+1)(x^6+x^3+x+2)(x^6+x^3+2x+1)(x^6+x^3+x^2+1)(x^6+x^3+x^2+2x+2)(x^6+x^3+2x^2+2x+1) \\
& (x^6+2x^3+x+1)(x^6+2x^3+2x+2)(x^6+2x^3+x^2+1)(x^6+2x^3+x^2+x+2)(x^6+2x^3+2x^2+x+1) \\
& (x^6+x^4+2x^2+1)(x^6+x^4+2x^2+x+2)(x^6+x^4+2x^2+2x+2)(x^6+x^4+x^3+1)(x^6+x^4+x^3+x+1) \\
& (x^6+x^4+x^3+2x+2)(x^6+x^4+x^3+x^2+2x+2)(x^6+x^4+2x^3+1)(x^6+x^4+2x^3+x+2)(x^6+x^4+2x^3+2x+1) \\
& (x^6+x^4+2x^3+x^2+x+2)(x^6+2x^4+1)(x^6+2x^4+x^2+1)(x^6+2x^4+x^2+x+2)(x^6+2x^4+x^2+2x+2) \\
& (x^6+2x^4+x^3+2x+1)(x^6+2x^4+x^3+x^2+2)(x^6+2x^4+x^3+x^2+x+2)(x^6+2x^4+x^3+x^2+2x+1) \\
& (x^6+2x^4+2x^3+x+1)(x^6+2x^4+2x^3+x^2+2)(x^6+2x^4+2x^3+x^2+x+1)(x^6+2x^4+2x^3+x^2+2x+2) \\
& (x^6+x^5+2)(x^6+x^5+x+2)(x^6+x^5+x^2+x+1)(x^6+x^5+x^3+2)(x^6+x^5+x^3+x+1)(x^6+x^5+x^3+x^2+1) \\
& (x^6+x^5+x^3+x^2+x+2)(x^6+x^5+x^3+2x^2+x+2)(x^6+x^5+2x^3+1)(x^6+x^5+2x^3+x^2+x+1) \\
& (x^6+x^5+2x^3+x^2+2x+1)(x^6+x^5+2x^3+2x^2+1)(x^6+x^5+2x^3+2x^2+2)(x^6+x^5+x^4+1)(x^6+x^5+x^4+x+1) \\
& (x^6+x^5+x^4+x^2+2x+2)(x^6+x^5+x^4+2x^2+2)(x^6+x^5+x^4+2x^2+2x+1)(x^6+x^5+x^4+x^3+x+2) \\
& (x^6+x^5+x^4+x^3+2x+1)(x^6+x^5+x^4+x^3+x^2+x+1)(x^6+x^5+x^4+x^3+x^2+x+2)(x^6+x^5+x^4+x^3+2x^2+2x+2) \\
& (x^6+x^5+x^4+2x^3+x+1)(x^6+x^5+x^4+2x^3+2x^2+1)(x^6+x^5+x^4+2x^3+2x^2+2x+2)(x^6+x^5+2x^4+x^2+2) \\
& (x^6+x^5+2x^4+x^2+2x+1)(x^6+x^5+2x^4+2x^2+2x+2)(x^6+x^5+2x^4+x^3+x+2)(x^6+x^5+2x^4+x^3+x^2+2) \\
& (x^6+x^5+2x^4+x^3+x^2+2x+2)(x^6+x^5+2x^4+x^3+2x^2+x+2)(x^6+x^5+2x^4+x^3+2x^2+2x+1) \\
& (x^6+x^5+2x^4+2x^3+1)(x^6+x^5+2x^4+2x^3+2)(x^6+x^5+2x^4+2x^3+x^2+2x+2)(x^6+x^5+2x^4+2x^3+2x^2+2) \\
& (x^6+x^5+2x^4+2x^3+2x^2+2x+1)(x^6+2x^5+2)(x^6+2x^5+2x+2)(x^6+2x^5+x^2+2x+1)(x^6+2x^5+x^3+1) \\
& (x^6+2x^5+x^3+x^2+x+1)(x^6+2x^5+x^3+x^2+2x+1)(x^6+2x^5+x^3+2x^2+1)(x^6+2x^5+x^3+2x^2+2) \\
& (x^6+2x^5+2x^3+2)(x^6+2x^5+2x^3+2x+1)(x^6+2x^5+2x^3+x^2+1)(x^6+2x^5+2x^3+x^2+2x+2) \\
& (x^6+2x^5+2x^3+2x^2+2x+2)(x^6+2x^5+x^4+1)(x^6+2x^5+x^4+2x+1)(x^6+2x^5+x^4+x^2+x+2) \\
& (x^6+2x^5+x^4+2x^2+2)(x^6+2x^5+x^4+2x^2+x+1)(x^6+2x^5+x^4+x^3+2x+1)(x^6+2x^5+x^4+x^3+2x^2+1) \\
& (x^6+2x^5+x^4+x^3+2x^2+x+2)(x^6+2x^5+x^4+2x^3+x+1)(x^6+2x^5+x^4+2x^3+2x+2) \\
& (x^6+2x^5+x^4+2x^3+x^2+2x+1)(x^6+2x^5+x^4+2x^3+x^2+2x+2)(x^6+2x^5+x^4+2x^3+2x^2+x+2) \\
& (x^6+2x^5+2x^4+x^2+2)(x^6+2x^5+2x^4+x^2+x+1)(x^6+2x^5+2x^4+2x^2+x+2)(x^6+2x^5+2x^4+x^3+1) \\
& (x^6+2x^5+2x^4+x^3+2)(x^6+2x^5+2x^4+x^3+x^2+x+2)(x^6+2x^5+2x^4+x^3+2x^2+2) \\
& (x^6+2x^5+2x^4+x^3+2x^2+x+1)(x^6+2x^5+2x^4+2x^3+2x+2)(x^6+2x^5+2x^4+2x^3+x^2+2) \\
& (x^6+2x^5+2x^4+2x^3+x^2+x+2)(x^6+2x^5+2x^4+2x^3+2x^2+x+1)(x^6+2x^5+2x^4+2x^3+2x^2+2x+2)
\end{aligned}$$