

## The finite field GF(64)

Let us define the field GF(64) by the irreducible polynomial  $f(x) = x^6 + x + 1$ .

$$\begin{array}{lll}
 1 & g^{21} = x^5 + x^4 + x^3 + x + 1 & g^{42} = x^5 + x^4 + x^3 + x \\
 g = x & g^{22} = x^5 + x^4 + x^2 + 1 & g^{43} = x^5 + x^4 + x^2 + x + 1 \\
 g^2 = x^2 & g^{23} = x^5 + x^3 + 1 & g^{44} = x^5 + x^3 + x^2 + 1 \\
 g^3 = x^3 & g^{24} = x^4 + 1 & g^{45} = x^4 + x^3 + 1 \\
 g^4 = x^4 & g^{25} = x^5 + x & g^{46} = x^5 + x^4 + x \\
 g^5 = x^5 & g^{26} = x^2 + x + 1 & g^{47} = x^5 + x^2 + x + 1 \\
 g^6 = x + 1 & g^{27} = x^3 + x^2 + x & g^{48} = x^3 + x^2 + 1 \\
 g^7 = x^2 + x & g^{28} = x^4 + x^3 + x^2 & g^{49} = x^4 + x^3 + x \\
 g^8 = x^3 + x^2 & g^{29} = x^5 + x^4 + x^3 & g^{50} = x^5 + x^4 + x^2 \\
 g^9 = x^4 + x^3 & g^{30} = x^5 + x^4 + x + 1 & g^{51} = x^5 + x^3 + x + 1 \\
 g^{10} = x^5 + x^4 & g^{31} = x^5 + x^2 + 1 & g^{52} = x^4 + x^2 + 1 \\
 g^{11} = x^5 + x + 1 & g^{32} = x^3 + 1 & g^{53} = x^5 + x^3 + x \\
 g^{12} = x^2 + 1 & g^{33} = x^4 + x & g^{54} = x^4 + x^2 + x + 1 \\
 g^{13} = x^3 + x & g^{34} = x^5 + x^2 & g^{55} = x^5 + x^3 + x^2 + x \\
 g^{14} = x^4 + x^2 & g^{35} = x^3 + x + 1 & g^{56} = x^4 + x^3 + x^2 + x + 1 \\
 g^{15} = x^5 + x^3 & g^{36} = x^4 + x^2 + x & g^{57} = x^5 + x^4 + x^3 + x^2 + x \\
 g^{16} = x^4 + x + 1 & g^{37} = x^5 + x^3 + x^2 & g^{58} = x^5 + x^4 + x^3 + x^2 + x + 1 \\
 g^{17} = x^5 + x^2 + x & g^{38} = x^4 + x^3 + x + 1 & g^{59} = x^5 + x^4 + x^3 + x^2 + 1 \\
 g^{18} = x^3 + x^2 + x + 1 & g^{39} = x^5 + x^4 + x^2 + x & g^{60} = x^5 + x^4 + x^3 + 1 \\
 g^{19} = x^4 + x^3 + x^2 + x & g^{40} = x^5 + x^3 + x^2 + x + 1 & g^{61} = x^5 + x^4 + 1 \\
 g^{20} = x^5 + x^4 + x^3 + x^2 & g^{41} = x^4 + x^3 + x^2 + 1 & g^{62} = x^5 + 1
 \end{array}$$