③ ⓐ result of initial key addition using k_0

all f key XOR w/ all f input ⇒ all Ø

ⓑ all bytes after key addition are 00

let $x=0$, $y=0$, using AES S-Box Table

gives Byte Substitution Layer of 63....63

ⓒ since Byte Substitution Layer is all 63,

the ShiftRows transformation is all 63.

ⓓ $C_0 = 02 \times B_0 + 03 \times B_5 + 01 \times B_{10} + 01 \times B_{15}$

$= 02 \times 63 + 03 \times 63 + 01 \times 63 + 01 \times 63$

$= 10 \times 01100011 + 11 \times 01100011 + 01 \times 01100011 + 01 \times 01100011$

$= x(x^6+x^5+x+1) + (x+1)(x^6+x^5+x+1) + \cancel{(x^6+x^5+x+1)} + \cancel{(x^6+x^5+x+1)}$

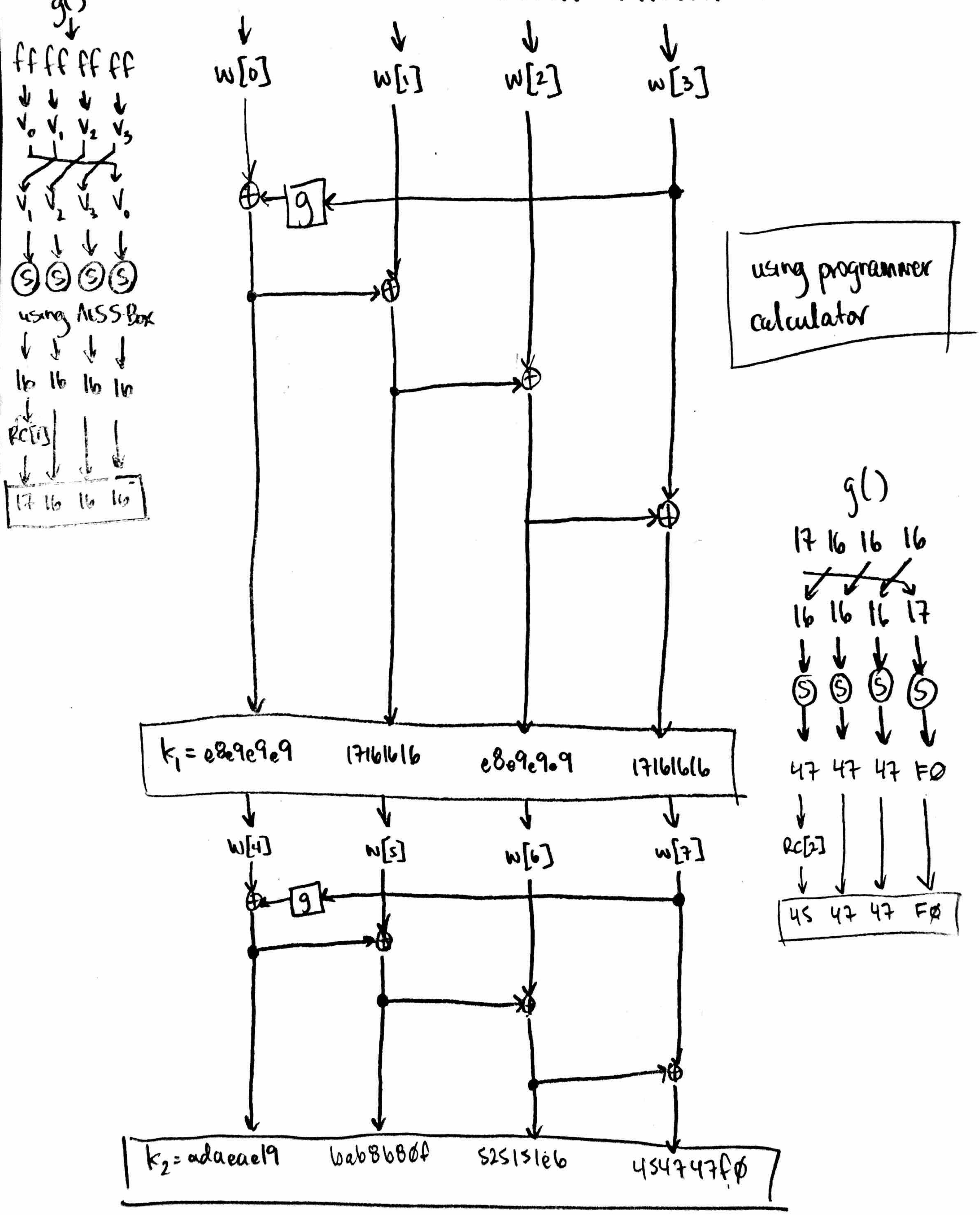
$= \cancel{x^7+x^6+x^2+x} + \cancel{x^7+x^6+x^2+x} + x^6+x^5+x+1$

$= x^6+x^5+x+1$

$= 0110011$

$C_0 = 63$

4) $k_0 \Rightarrow$ ffffffff f......f f......f f......f



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