(3) (a) result of initial key addition using k_0

all f key XOR w/ all f input $\Rightarrow$ all 0

(b) all bytes after key addition are 00

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

gives Byte Substitution Layer of 63....63

(c) since Byte Substitution Layer is all 63,

the ShiftRows transformation is all 63.

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

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

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

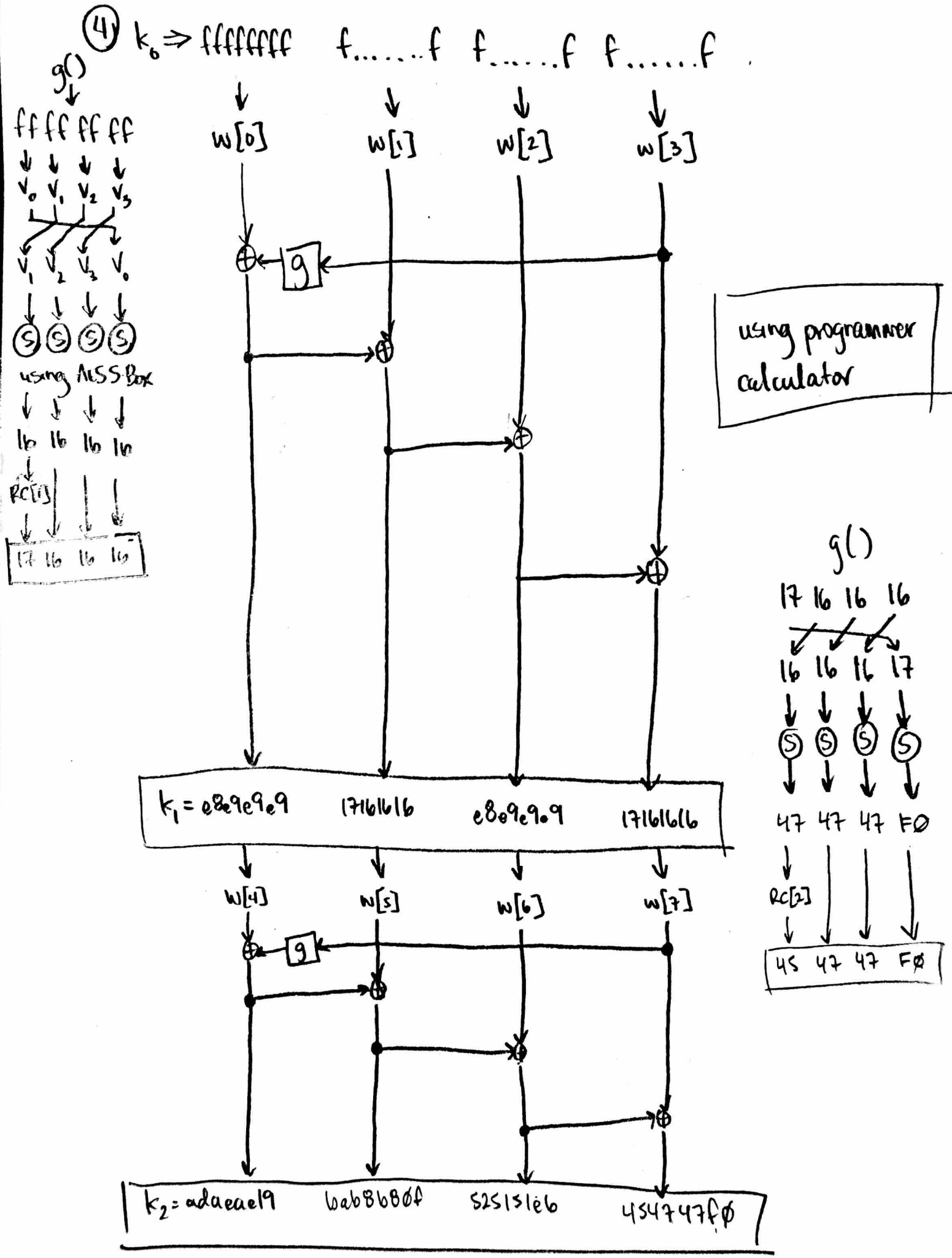
$= x(x^6+x^5+x+1) + (x+1)(x^6+x^5+x+1) + (x^6+x^5+x+1) + (x^6+x^5+x+1)$

$= x^7+x^6+x^2+x + x^7+x^6+x^2+x + x^6+x^5+x+1$

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

$= 01100011$

$C_0 = 63$


④
$k_0 \Rightarrow$ ffffffff f.....f f.....f f.....f
g()
ff ff ff ff
v_0 v_1 v_2 v_3
v_1 v_2 v_3 v_0
S S S S
using AES S-Box
16 16 16 16
RC[i]
17 16 16 16
w[0] w[1] w[2] w[3]
g
using programmer calculator
k_1 = e8e9e9e9 17161616 e8e9e9e9 17161616
w[4] w[5] w[6] w[7]
g
k_2 = adaeae19 bab86808 52515le6 45474 7f0
g()
17 16 16 16
16 16 16 17
S S S S
47 47 47 F0
RC[2]
45 47 47 F0