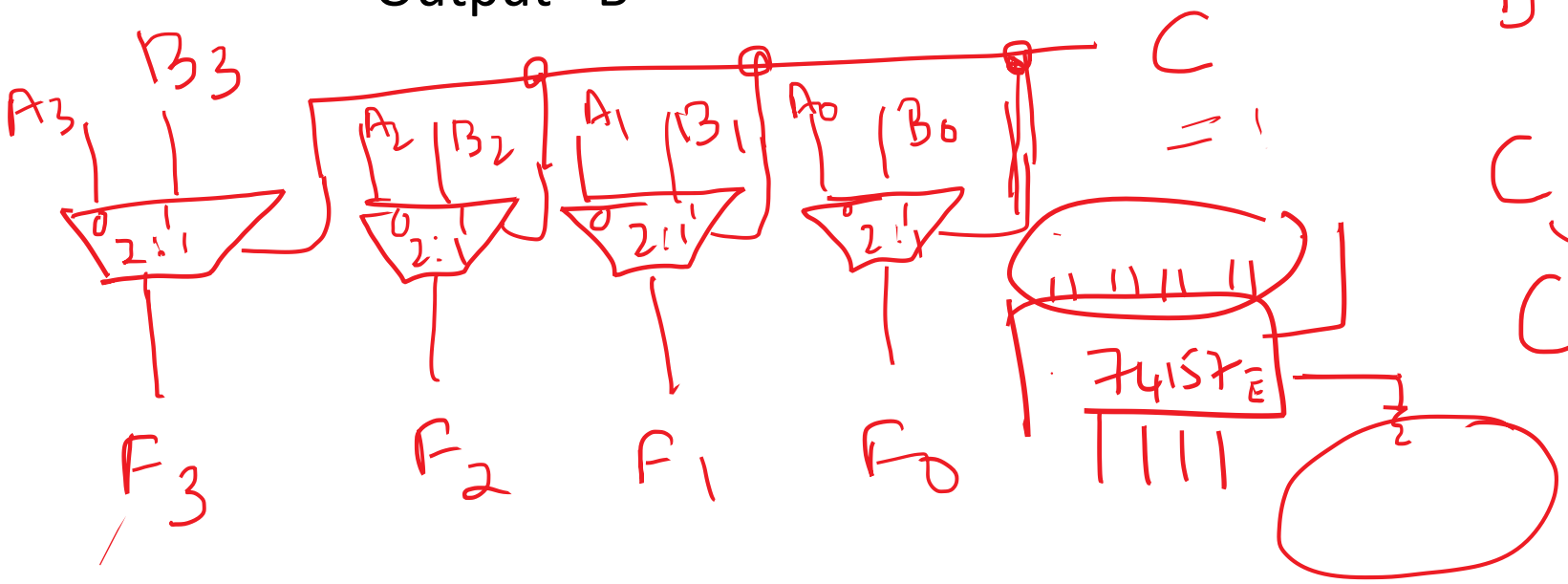
Multiplexers

Nibble Multiplexer

- A and B are two 4-bit numbers. Design a combinational circuit using suitable multiplexers according to following requirements.
  - If cntrl_ip ===0

    Output=A
  - Else

    Output =B

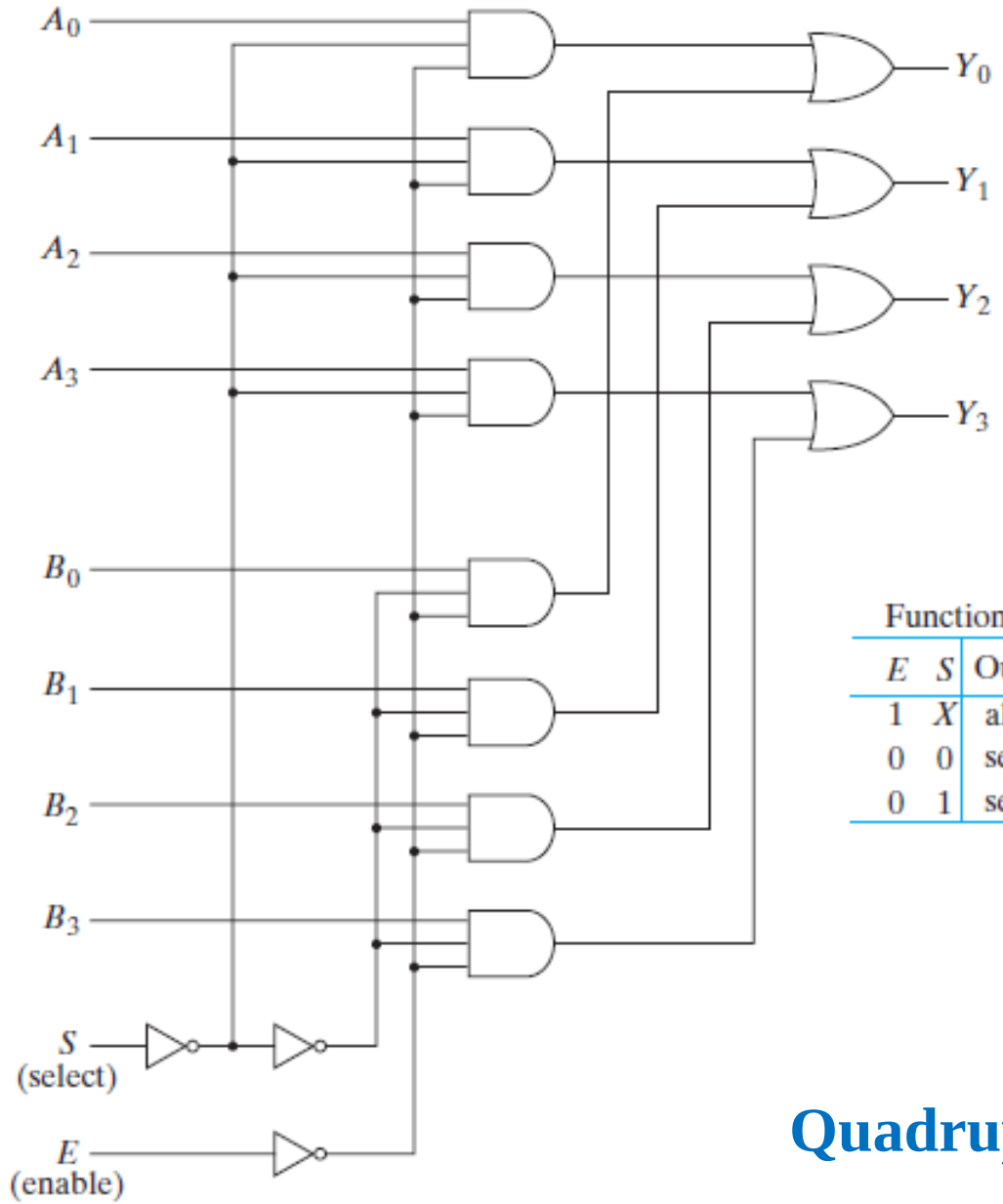


$A = A_3 A_2 A_1 A_0$

$B = B_3 B_2 B_1 B_0$

$C = 0 \Rightarrow F = A$

$C = 1 \Rightarrow F = B$



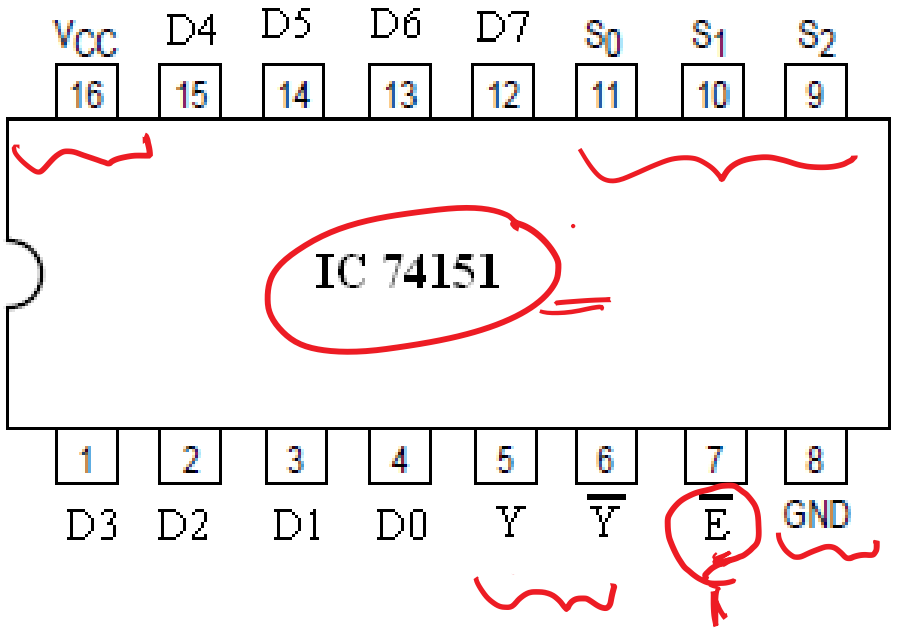
Function table

E	S	Output Y
1	X	all 0's
0	0	select A
0	1	select B

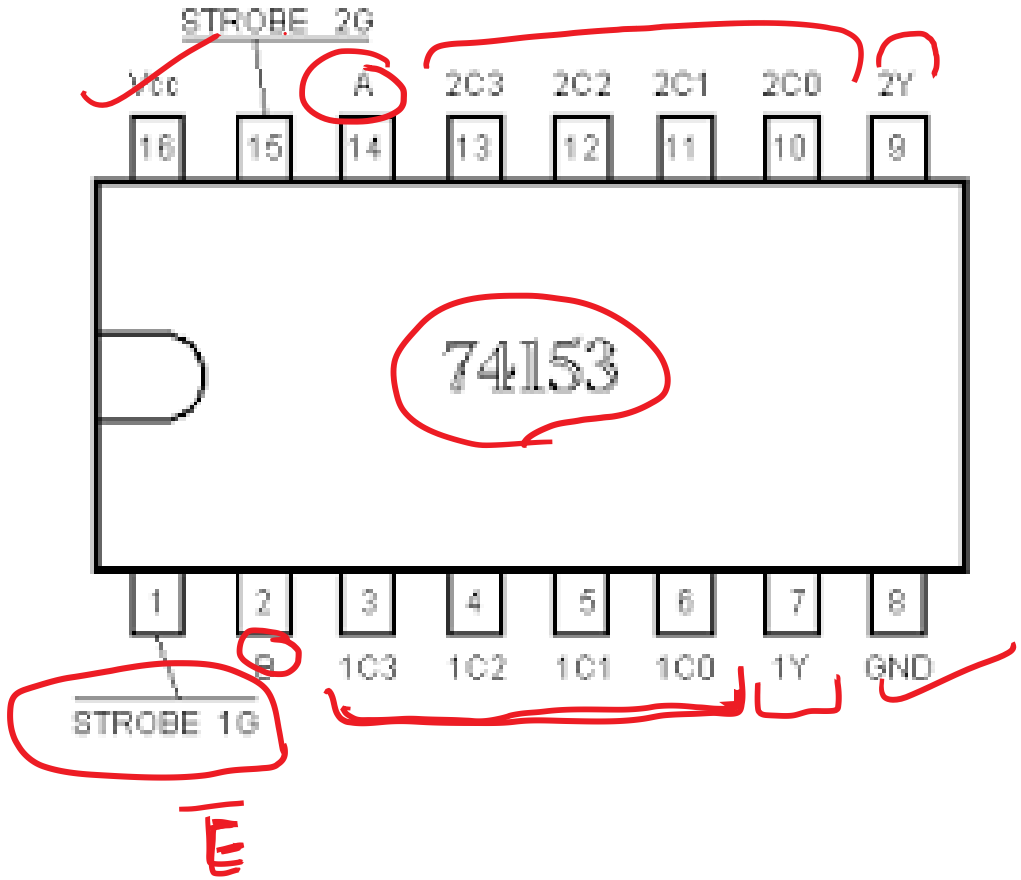
Quadruple 2:1 MUX or Nibble MUX

Multiplexer ICs :

74151- 8:1 MUX

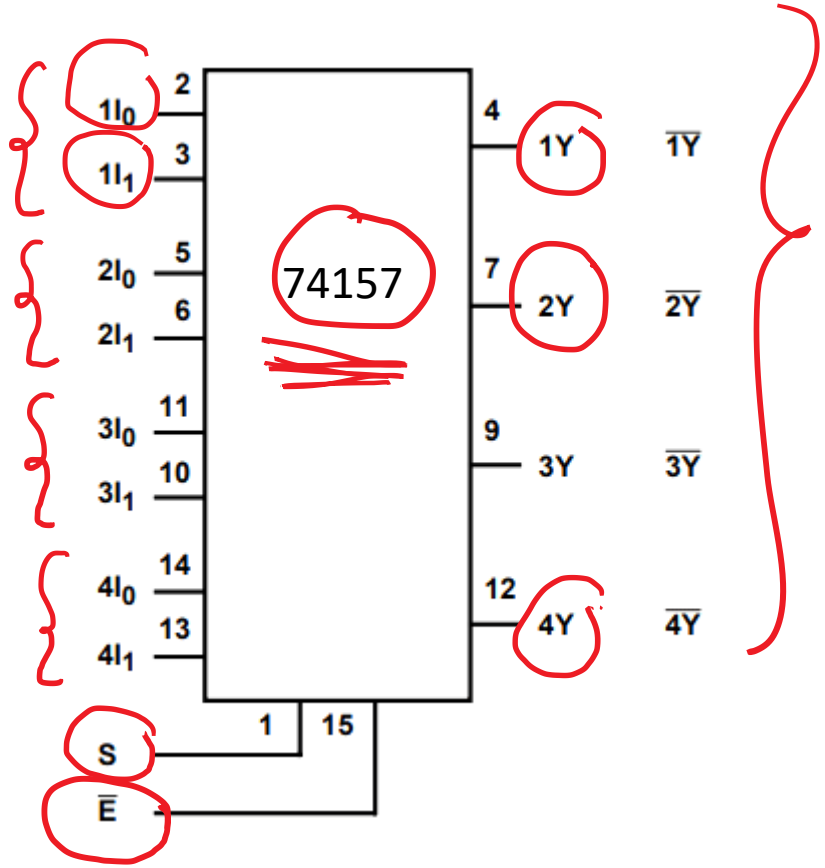


74153- 4:1 MUXs

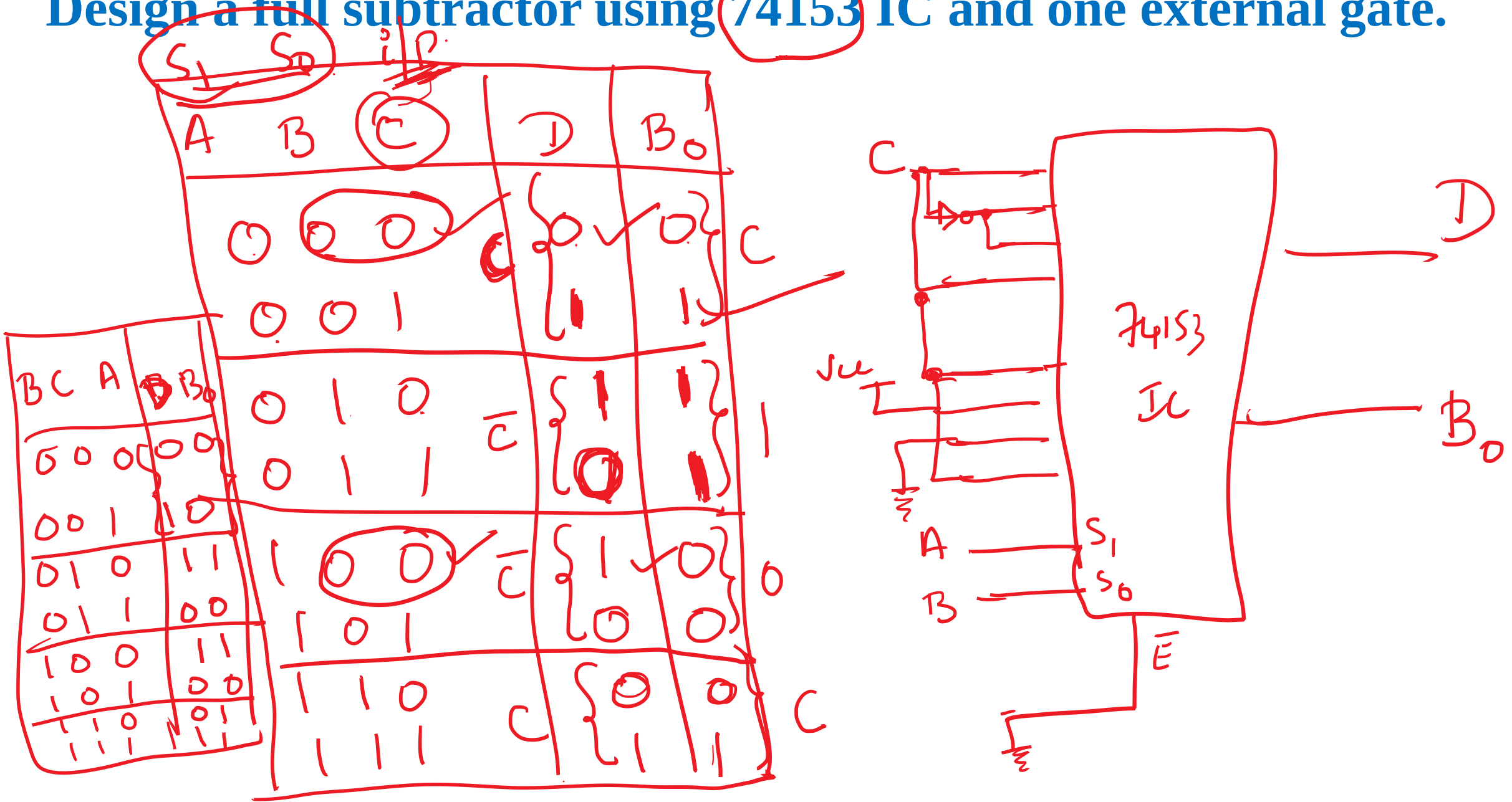


74157 Quad 2:1 MUX IC

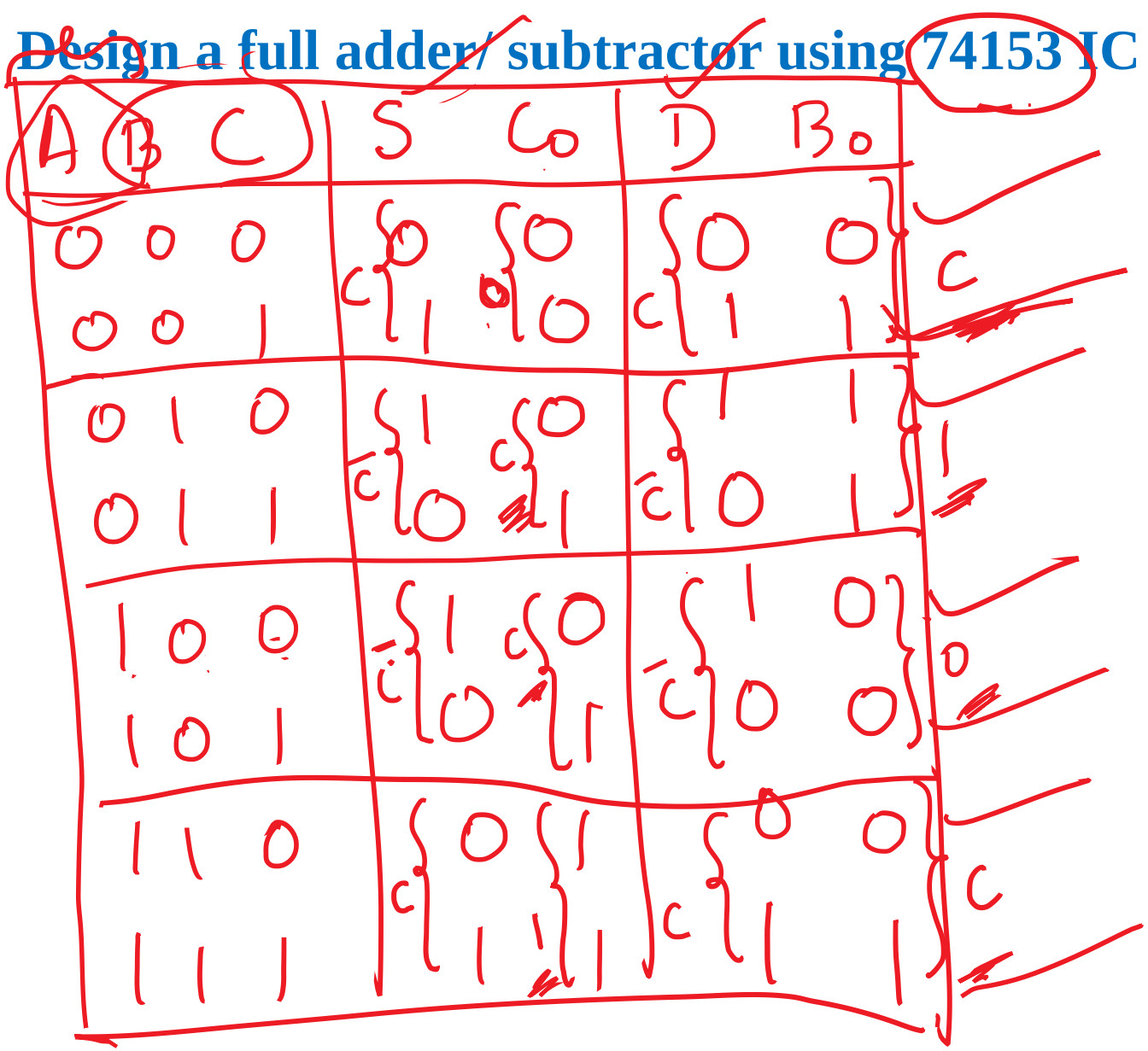
74151 → 8:1 mux , 1
74153 → 4:1 mux , 2
74157 → 2:1 mux , 4

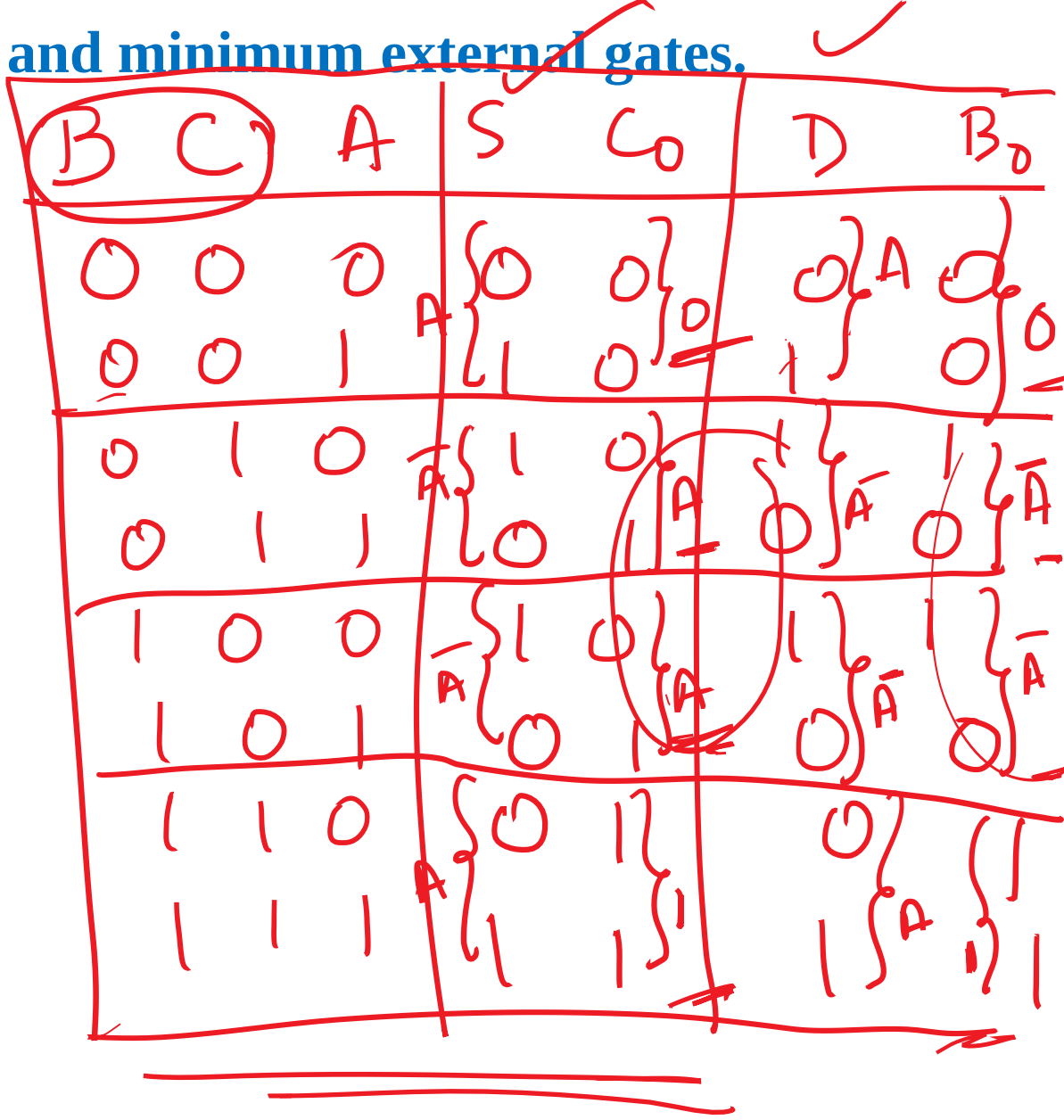


Design a full subtractor using 74153 IC and one external gate.

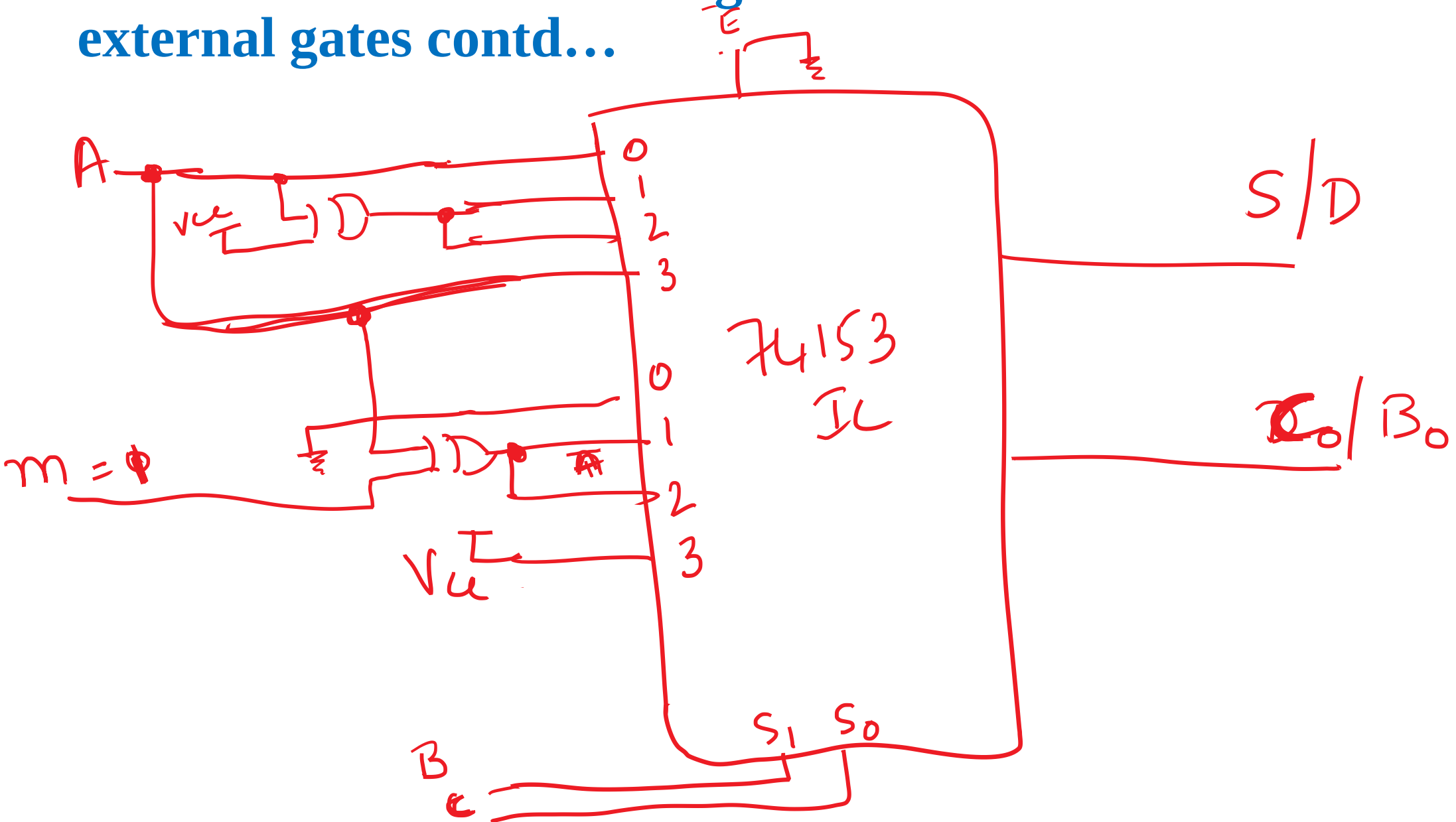


Design a full adder/ subtractor using 74153 IC and minimum external gates.



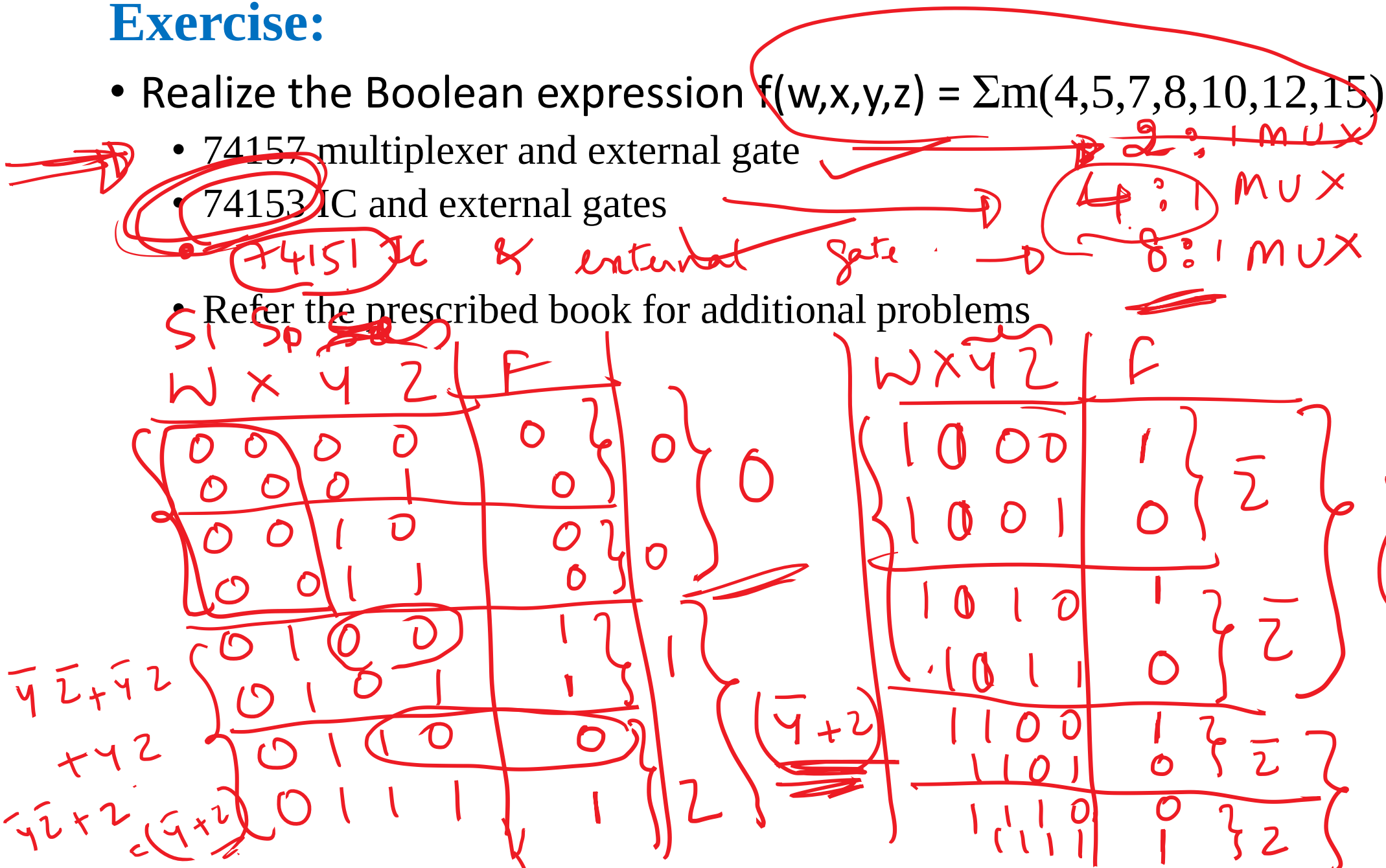


Full adder/subtractor using 74153 IC and minimum external gates contd…



Exercise:

- Realize the Boolean expression f(w,x,y,z) = Σm(4,5,7,8,10,12,15) using
  - 74157 multiplexer and external gate
  - 74153 IC and external gates
  - 74151 IC and external gate
  - Refer the prescribed book for additional problems



Question?