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Lab 1 Preliminary Work

Three Way Lighting System

1)

S_1	S_2	S_3	f
0	0	0	0
0	0	1	1
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	1

2) Canonical SOP

$$f = \bar{S_1}\bar{S_2}S_3 + \bar{S_1}S_2\bar{S_3} + S_1\bar{S_2}\bar{S_3} + S_1S_2S_3$$

$$f = \sum(1,2,4,7)$$

3) Canonical POS

$$f = (S_1+S_2+S_3)(S_1+\bar{S_2}+\bar{S_3})(\bar{S_1}+S_2+\bar{S_3})(\bar{S_1}+\bar{S_2}+S_3)$$

$$f = \Pi(0,3,5,6)$$

$S_1 = A \quad S_2 = B \quad S_3 = C$

$$(A+B+C)\ (A+\bar{B}+\bar{C})\ (\bar{A}+B+\bar{C})\ (\bar{A}+\bar{B}+C)$$

$$A + A\bar{B} + A\bar{C} + AB + 0 + B\bar{C} + AC + \bar{B}C + 0$$

$$A + A + A \qquad B\bar{C} + \bar{B}C$$

$$A$$

$$A + B\bar{C} + \bar{B}C$$

$$\bar{A} + \bar{A}B + \bar{A}C + \bar{A}B + 0 + BC$$

$$+ \bar{A}C + \bar{B}\bar{C} + 0$$

$$\bar{A} + \bar{A} + \bar{A} + BC + \bar{B}\bar{C}$$

$$\bar{A}$$

$$(A + B\bar{C} + \bar{B}C)\ (\bar{A} + BC + \bar{B}\bar{C})$$

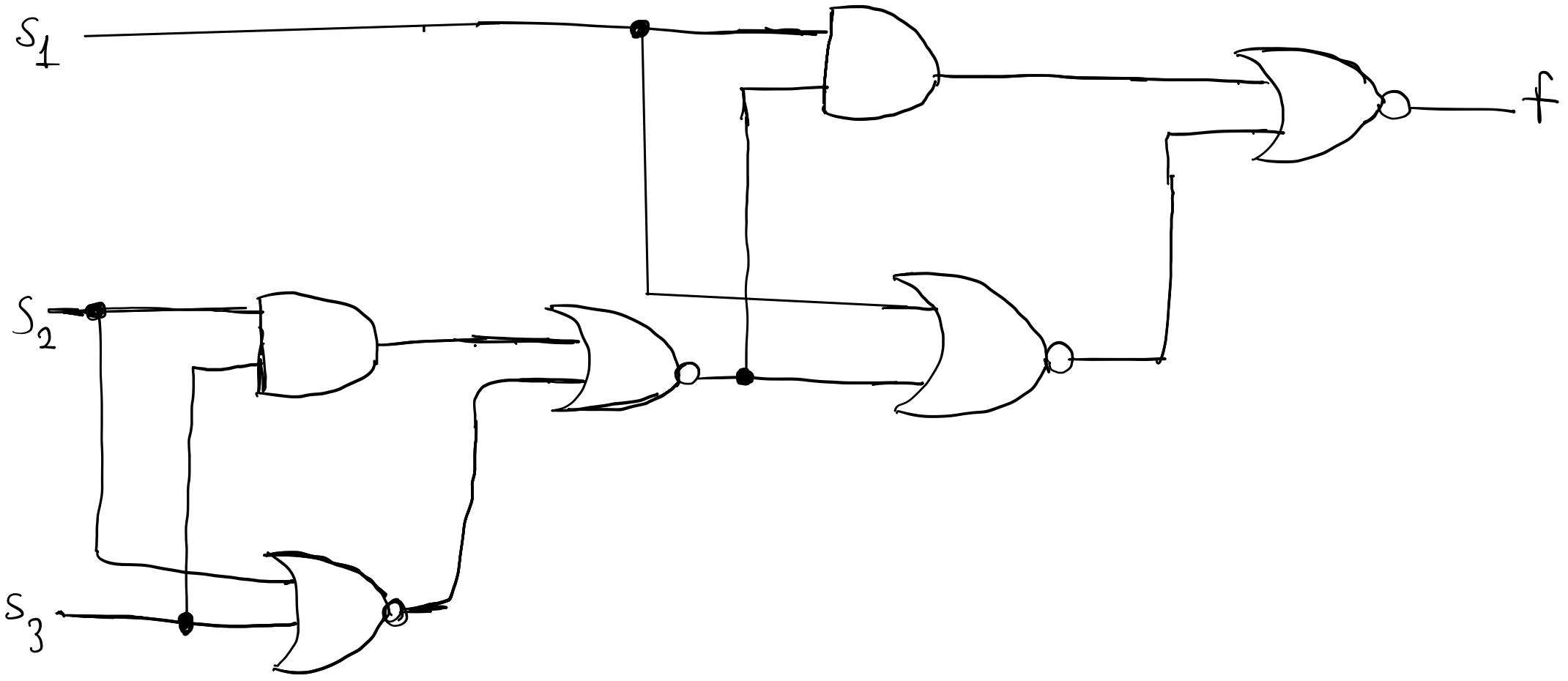
$$A\bar{A} + ABC + A\bar{B}\bar{C} + \bar{A}B\bar{C} + 0 + 0 + \bar{A}\bar{B}C + 0 + 0$$

$$= ABC + A\bar{B}\bar{C} + \bar{A}B\bar{C} + \bar{A}\bar{B}C$$

$$\rightarrow A(BC + \bar{B}\bar{C}) + \bar{A}(B\bar{C} + \bar{B}C)$$

$$A \oplus (B \oplus C)$$

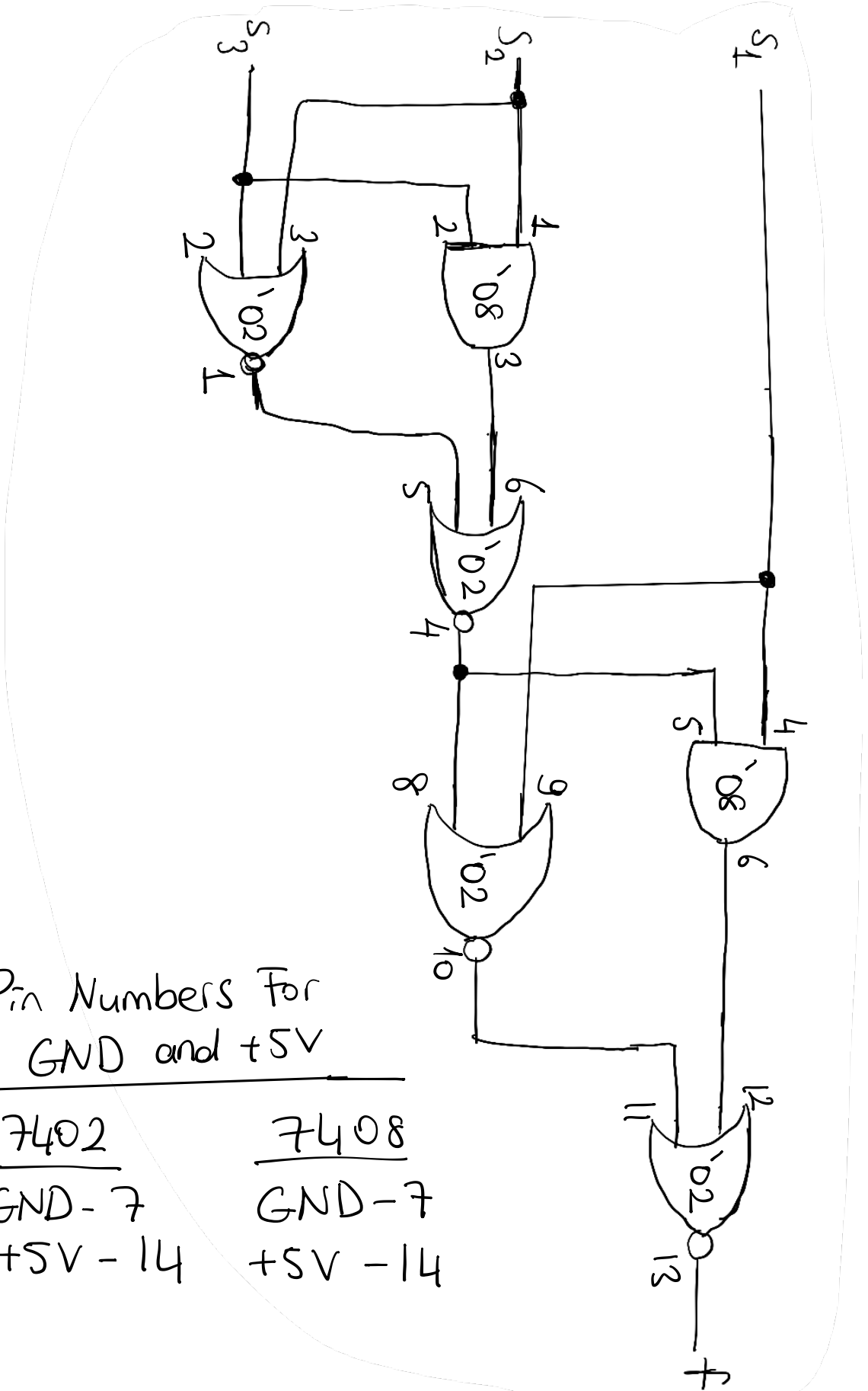
Logic Diagram



IC List:

1. One 7402 Quad 2-input NOR Gate IC
2. One 7408 Quad 2-input AND Gate IC

Circuit Schematic



Pin Numbers For GND and +5V

7402	7408
GND - 7	GND - 7
+5V - 14	+5V - 14