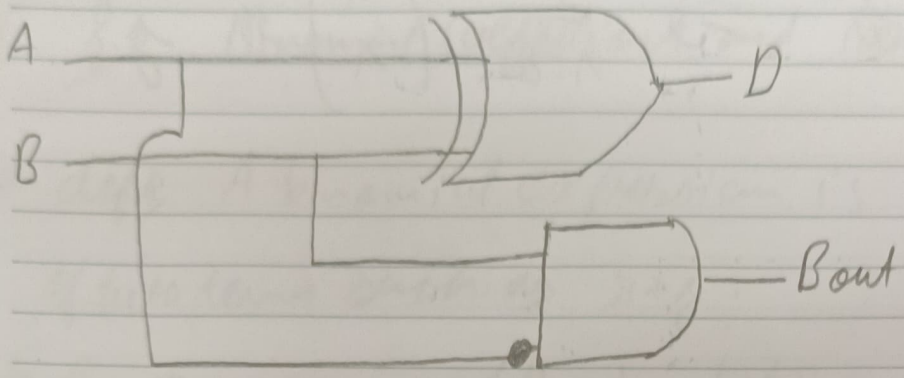
Moin Khan
22101287

① Half Subtractor

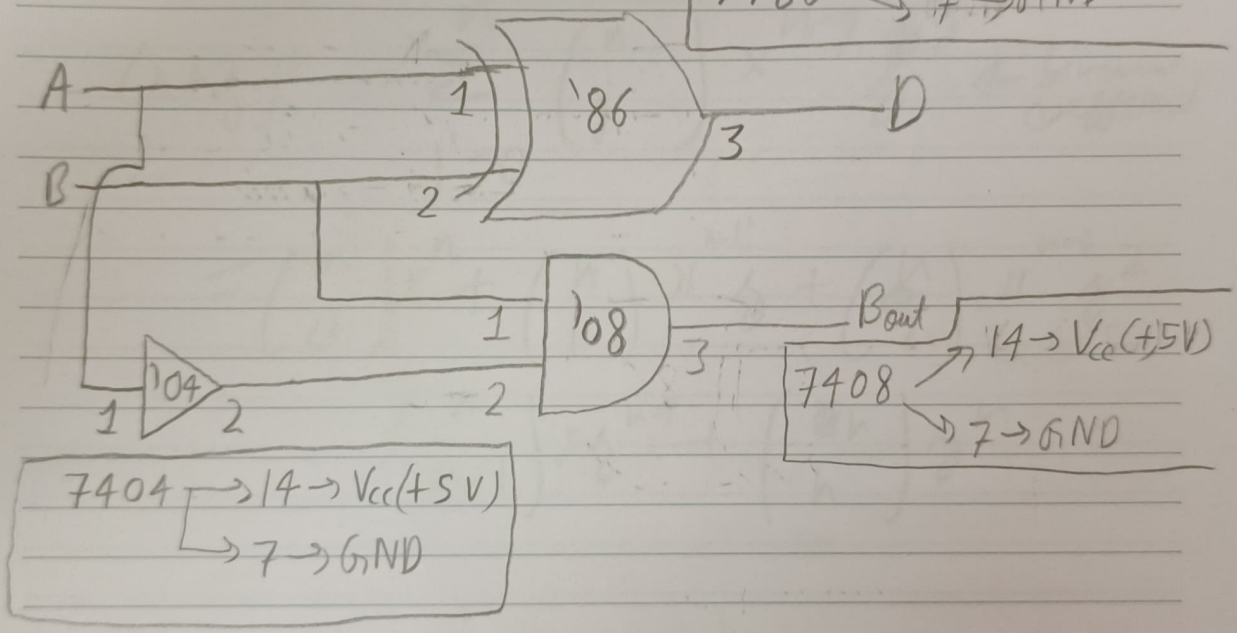
$D = \bar{A}B + A\bar{B}$

$B_{out} = \bar{A}B$

Logic Diagram



Circuit Schematic

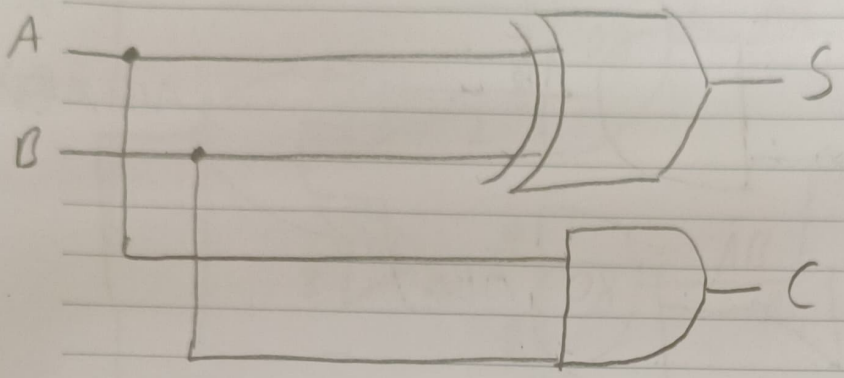


② Half Adder

$S = \bar{A}B + A\bar{B}$

$C = AB$

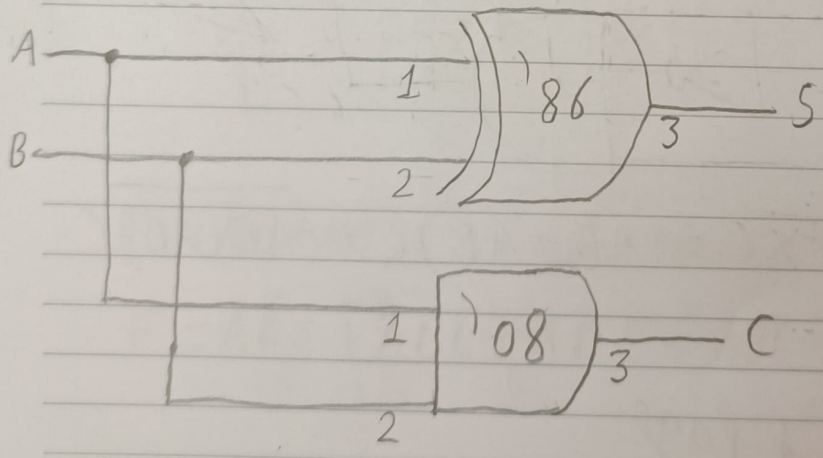
Logic Diagram



Circuit Schematic

7486 → 14 → V_{cc} (+5V)
↳ 7 → GND

7408 → 14 → V_{cc} (+5V)
↳ 7 → GND

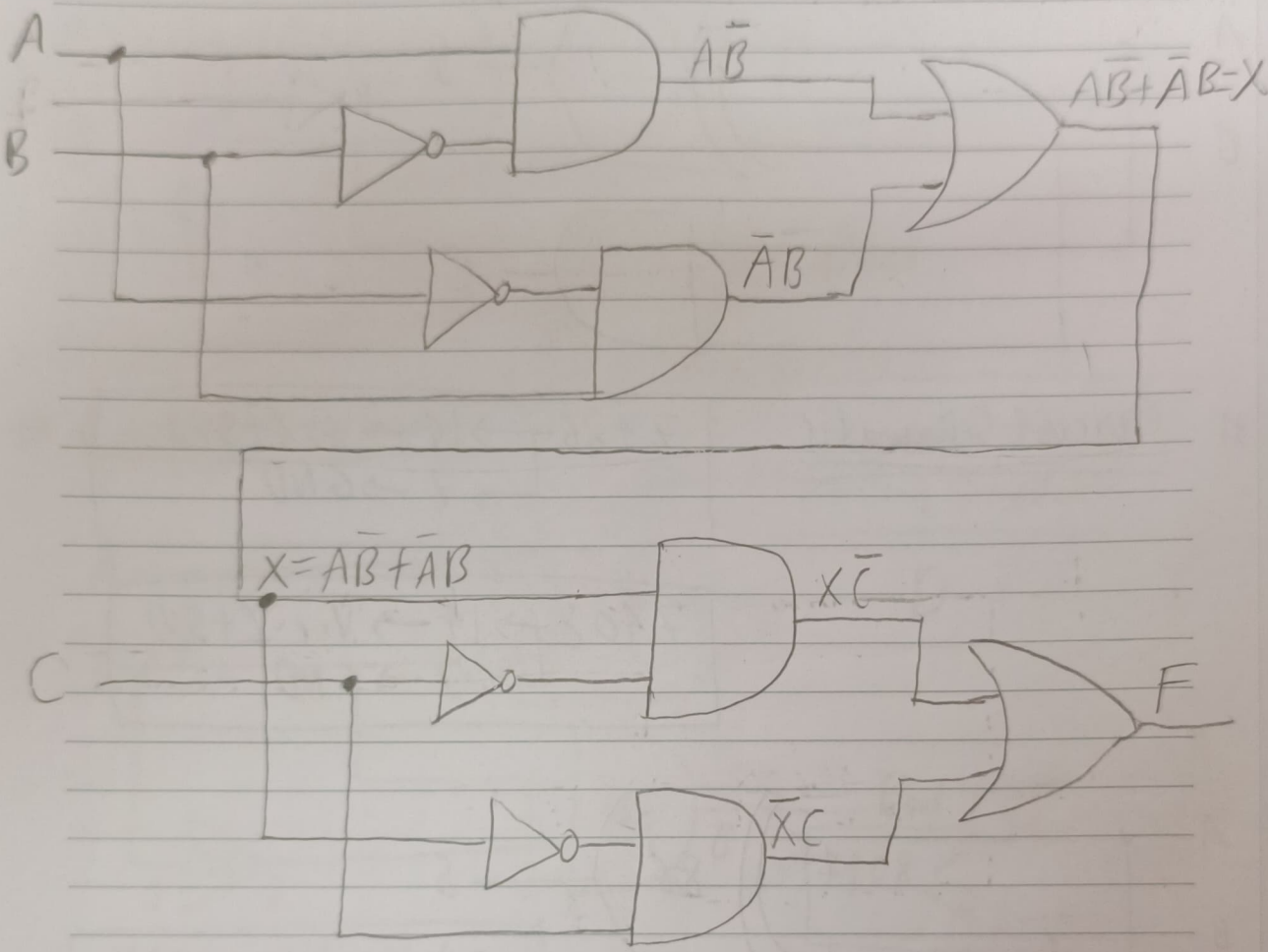


(3) 3-Input XOR Gate

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

$$F = (A\bar{B} + \bar{A}B)\bar{C} + \overline{(A\bar{B} + \bar{A}B)}C$$

Logic Diagram



$$F = X\bar{C} + \bar{X}C = (A\bar{B} + \bar{A}B)\bar{C} + \overline{(A\bar{B} + \bar{A}B)}C$$

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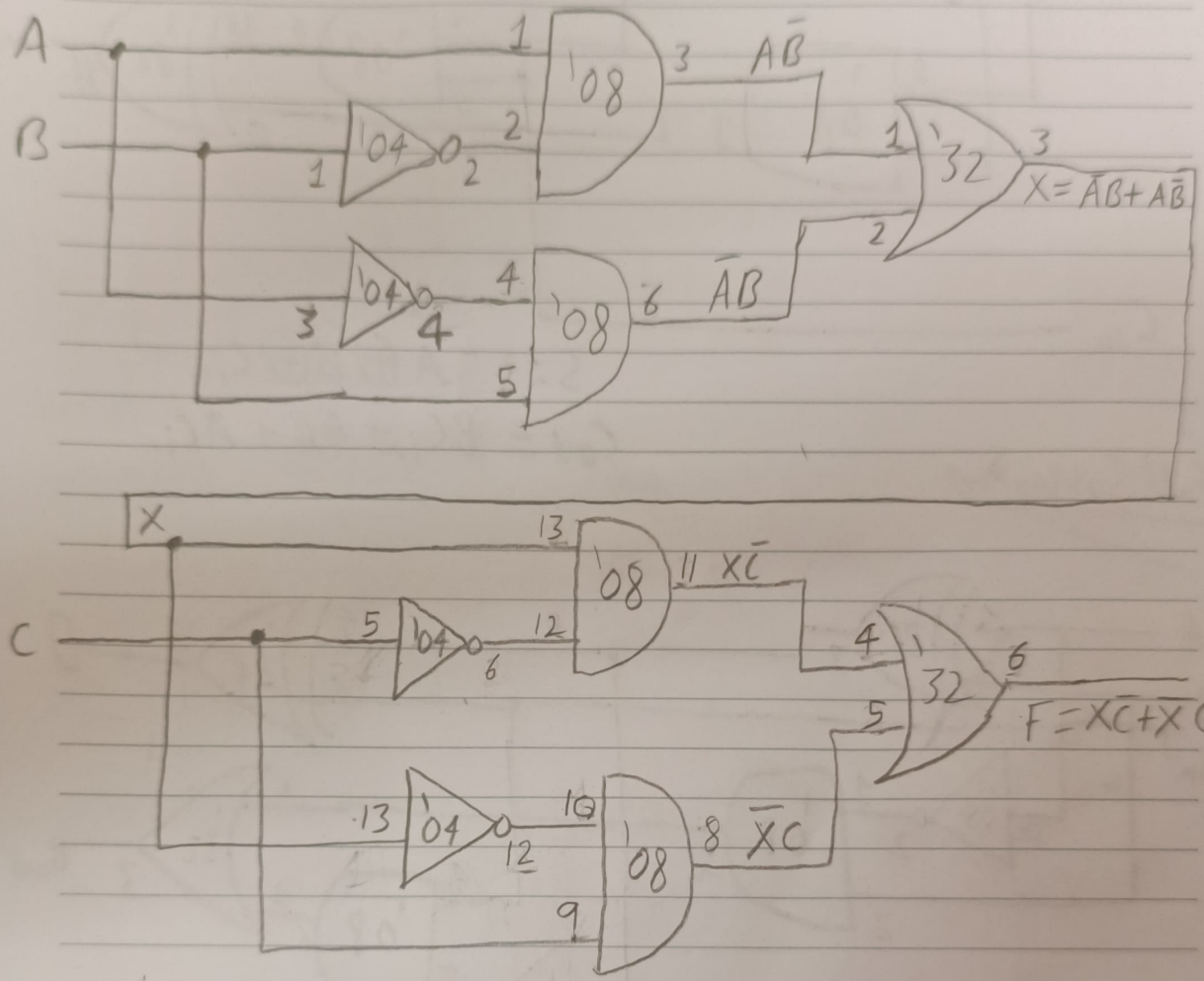
Circuit Schematics

7408 → 14 → V_{cc} (+5V)
↳ 7 → GND

7432 → 14 → V_{cc} (+5V)
↳ 7 → GND

7404 → 14 → V_{cc} (+5V)
↳ 7 → GND



$$F=(\bar{A}B+A\bar{B})\bar{C}+\overline{(\bar{A}B+A\bar{B})}C$$

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