

$$\textcircled{1} F = ABCD + \bar{A}DC + \bar{B}D\bar{C} + \bar{B}DC + ACDB$$

$$\Rightarrow F = ABCD + \bar{A}DC + \bar{B}D\bar{C} + \bar{B}DC \quad (\text{commutative rule})$$

$$\text{common factor } \bar{B}D(\bar{C} + C)$$

$$\Rightarrow F = ABCD + \bar{A}DC + \bar{B}D$$

$$\Rightarrow F = DC(\bar{A}B + \bar{A}) + \bar{B}D \quad \text{factoring}$$

$$\downarrow \quad (\text{using identity}) \quad \bar{A}B + \bar{A} = \bar{A} + B$$

$$\Rightarrow F = DC(\bar{A} + B) + \bar{B}D \quad \text{factor again}$$

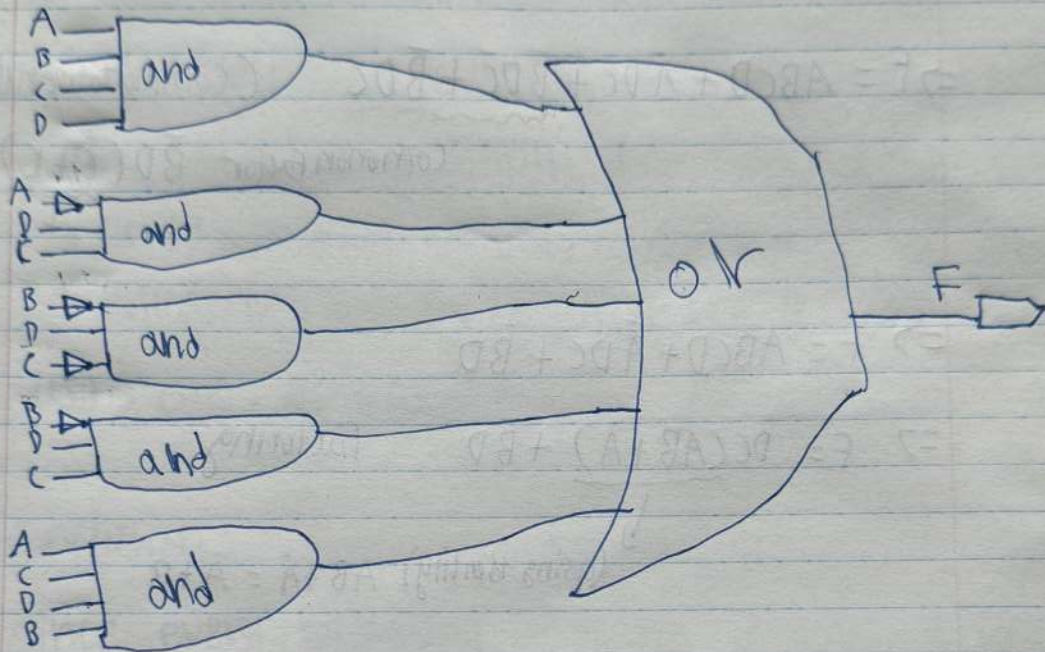
$$\Rightarrow F = D(C(\bar{A} + B) + \bar{B}) \quad \text{expand}$$

$$\Rightarrow F = D(C\bar{A} + CB + \bar{B}) \quad (\text{using identity})$$

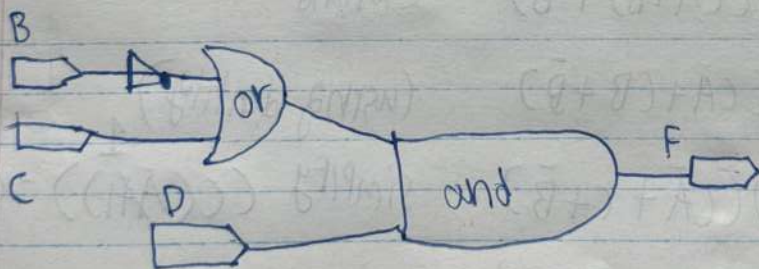
$$\Rightarrow F = D(C\bar{A} + C + \bar{B}) \quad \text{simplify } (C(\bar{A} + 1)) = C$$

$$\Rightarrow F = D(C + \bar{B})$$

original :



simplified: $F = DC\bar{B} + C$



I learned:

How to build a circuit, what the circuit represent, How to assemble them, How simplify them using algebra and finally learning what every symble means.