

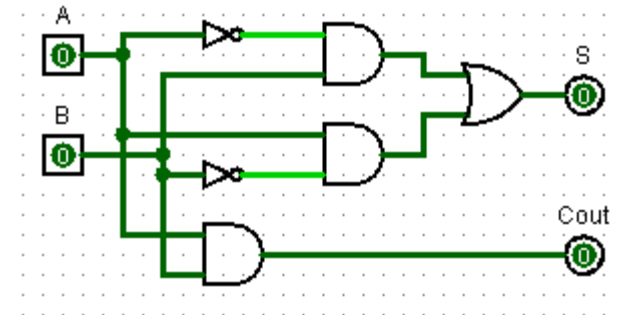
SMI Semestre 3
Module: Electronique

TP 3: Opérations arithmétiques et drapeaux d'état

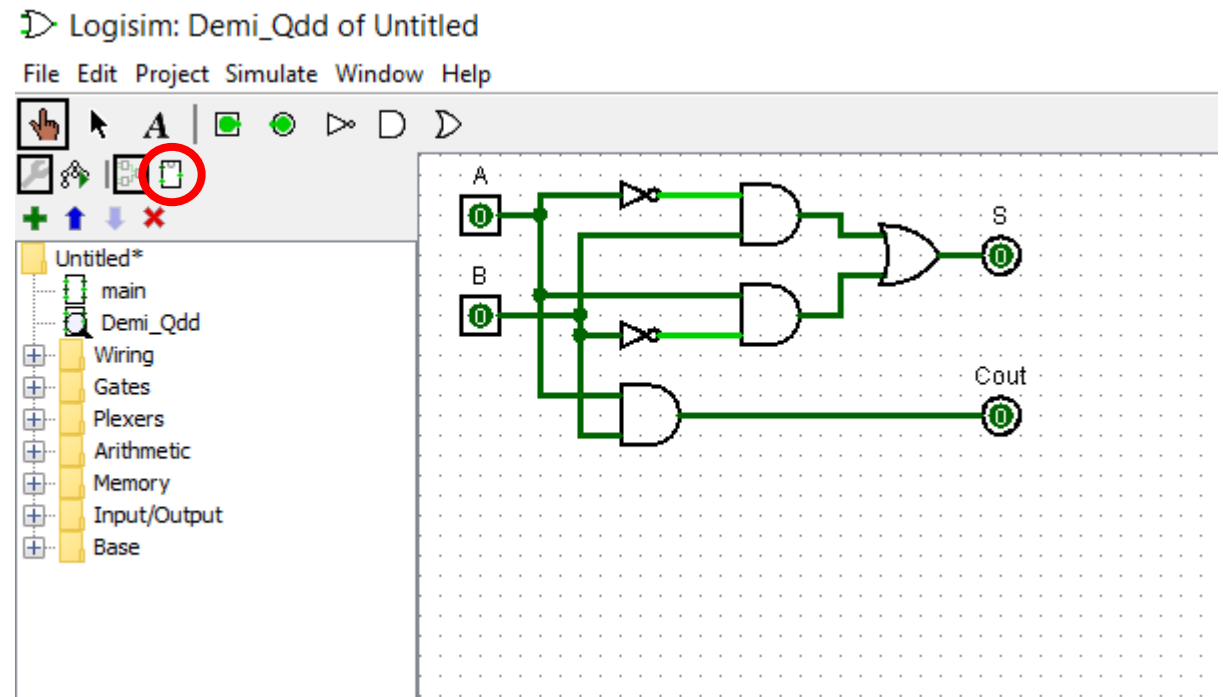
1. Demi-additionneur d'un bit



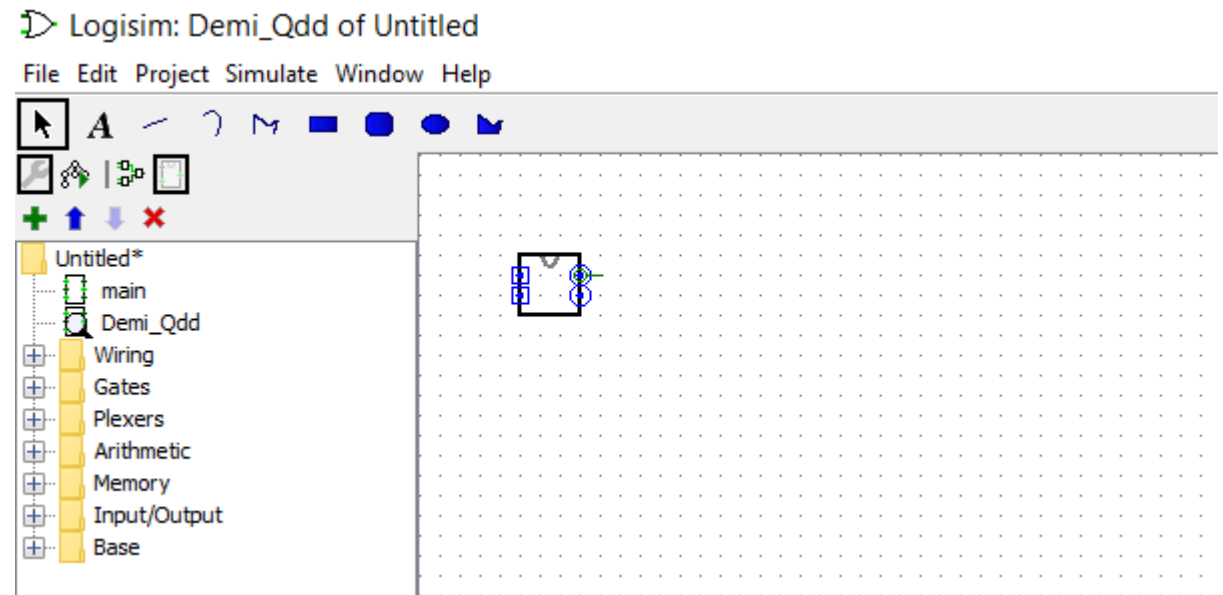
| A | B | S | Cout |
|---|---|---|------|
| 0 | 0 | 0 | 0 |
| 0 | 1 | 1 | 0 |
| 1 | 0 | 1 | 0 |
| 1 | 1 | 0 | 1 |



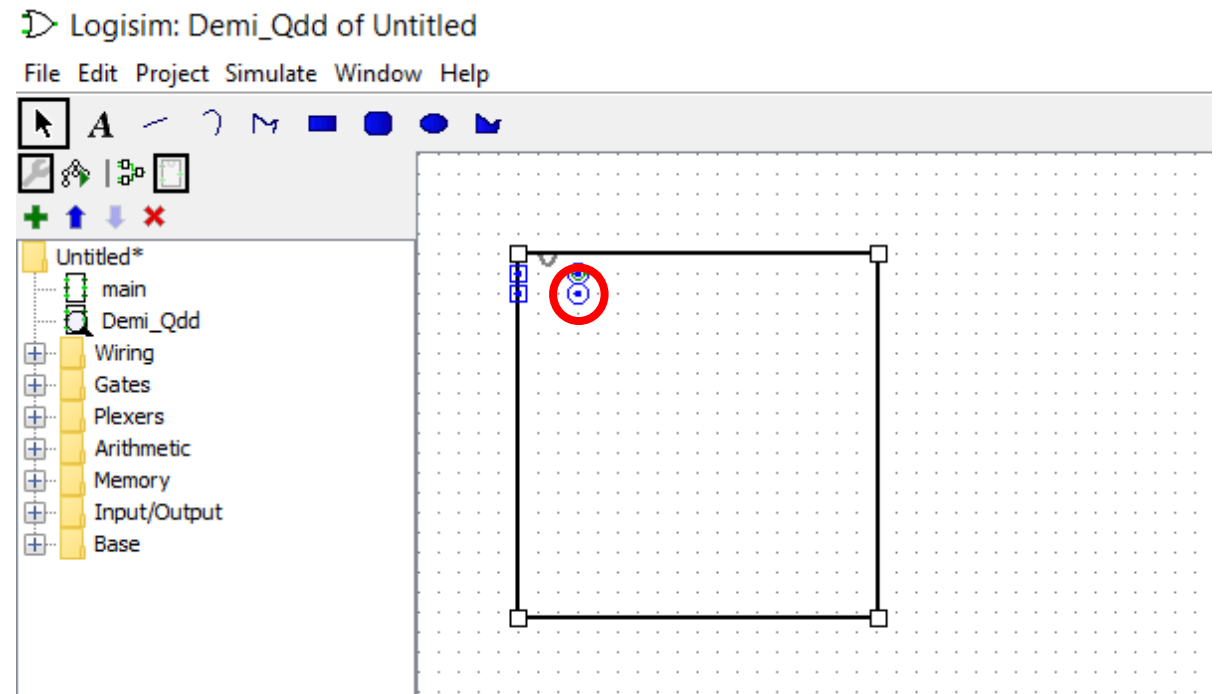
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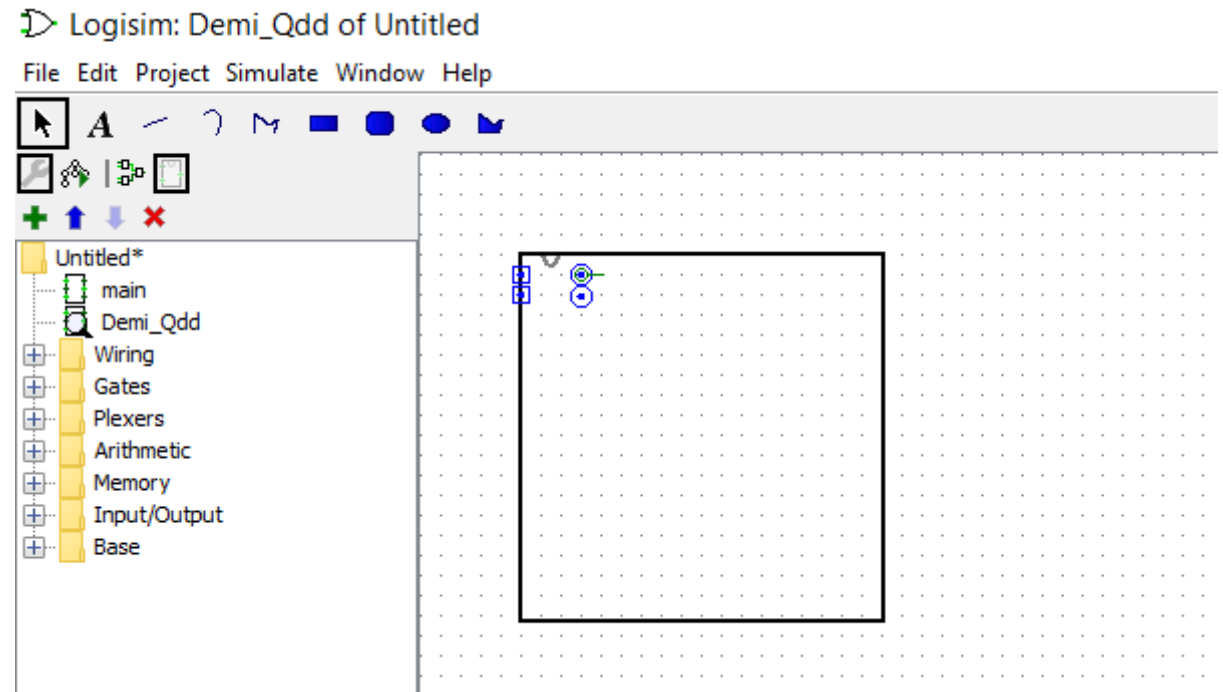
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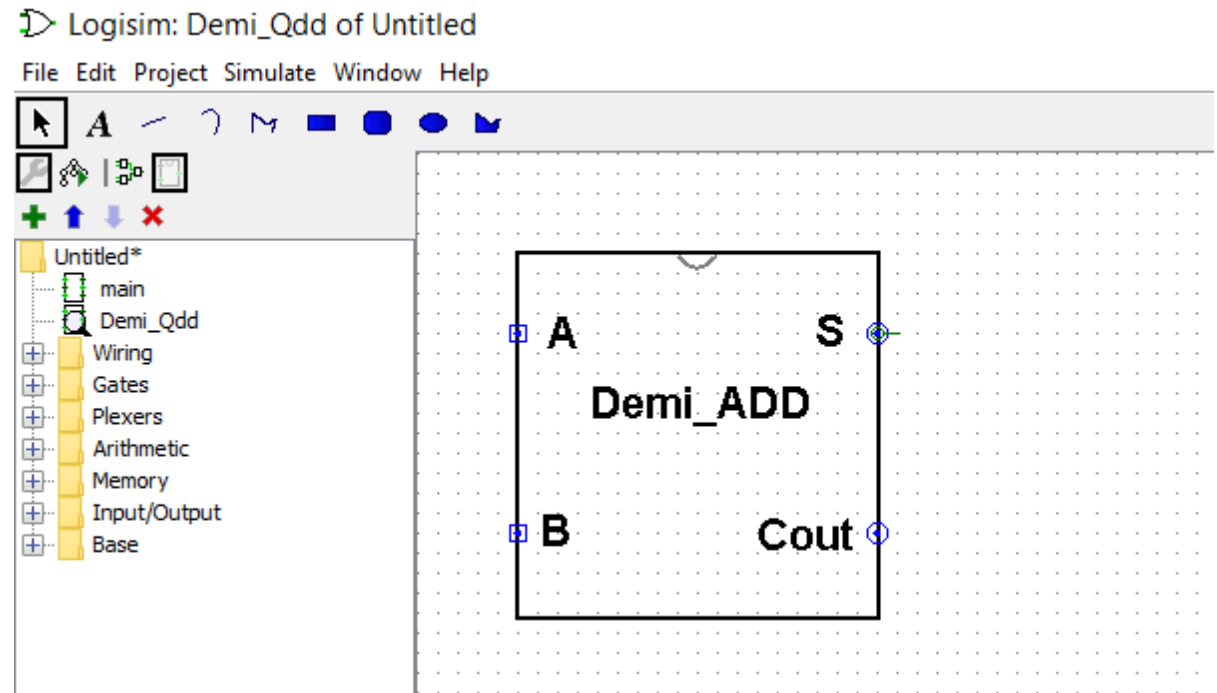
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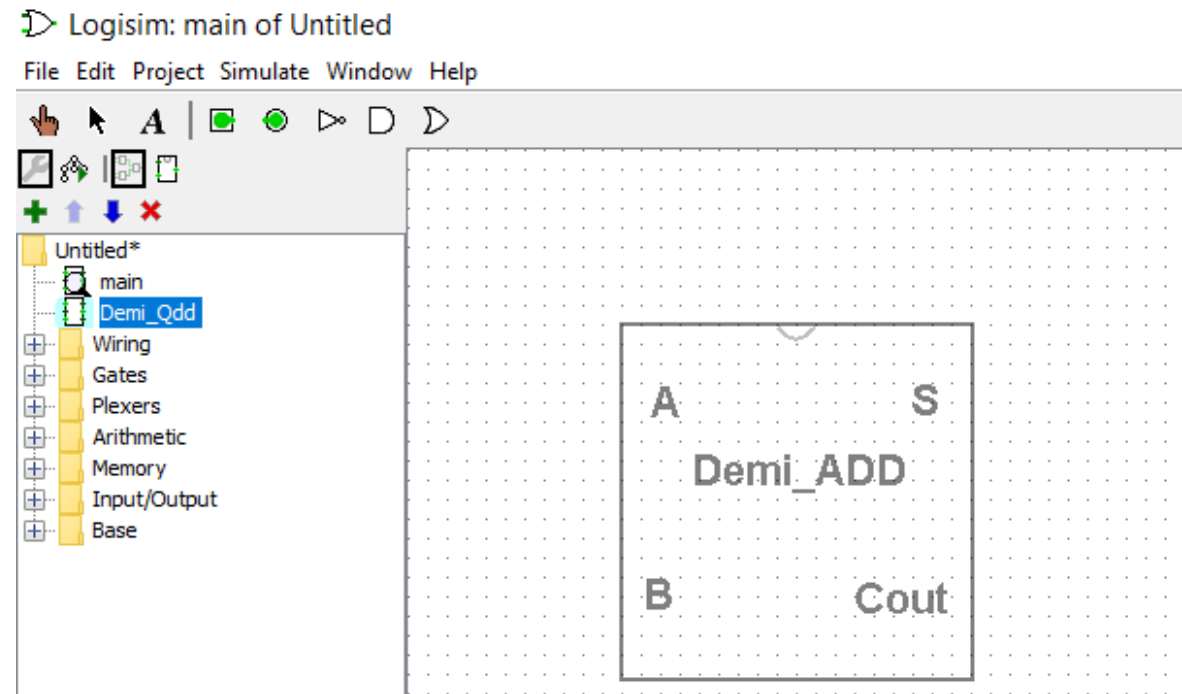
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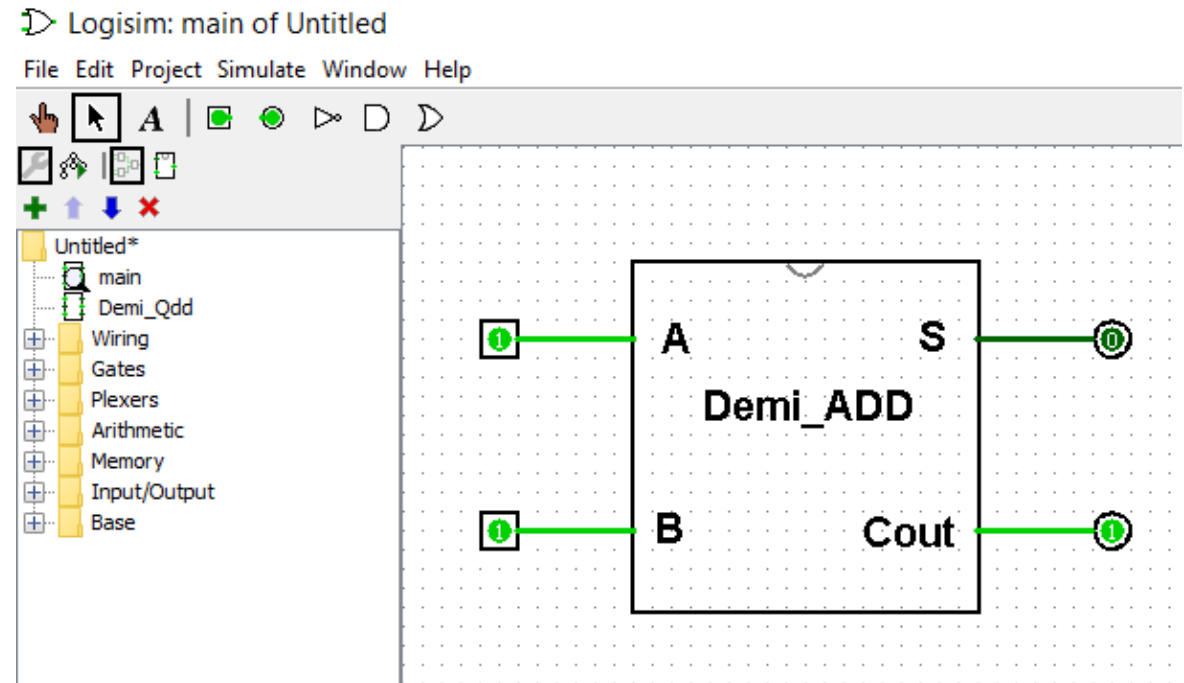
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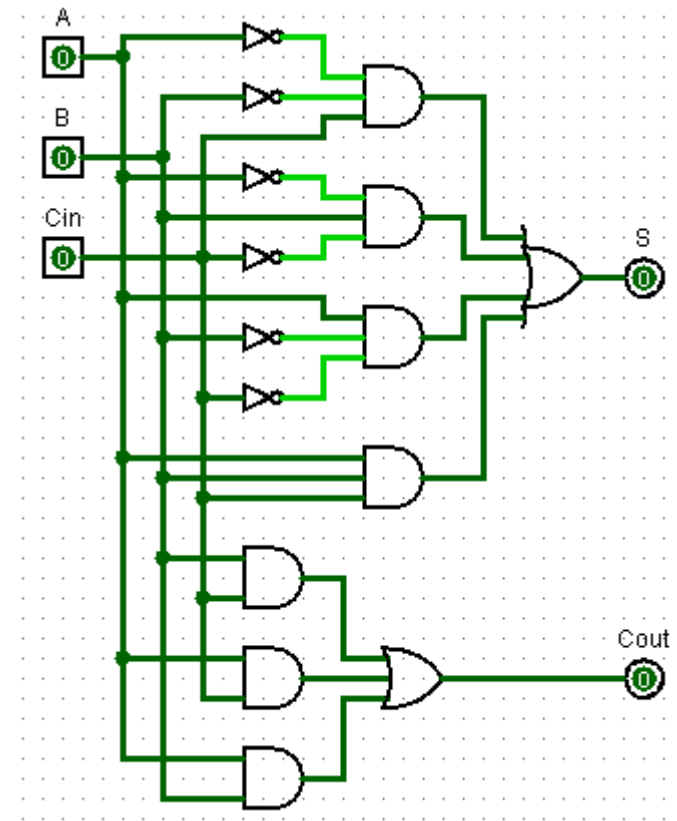
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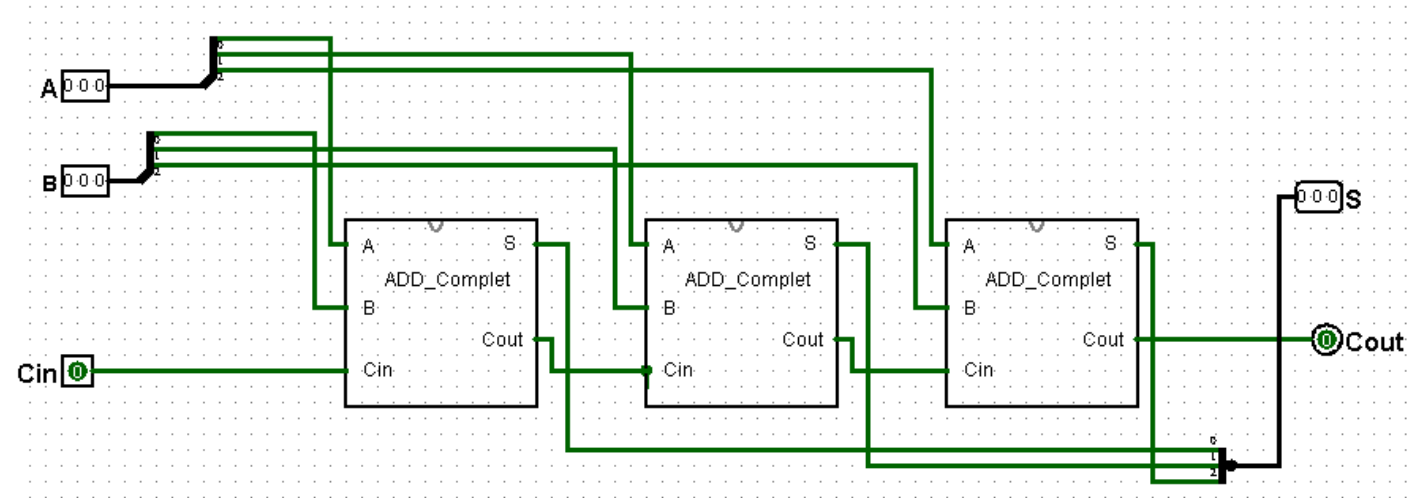
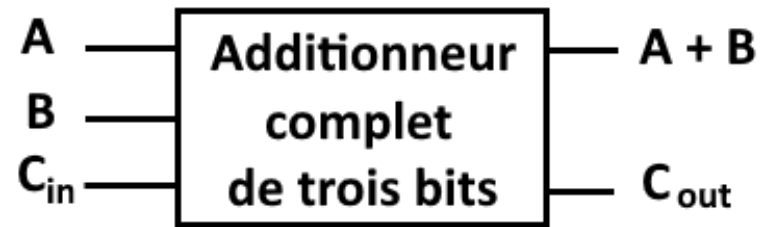
2. Additionneur complet d'un bit



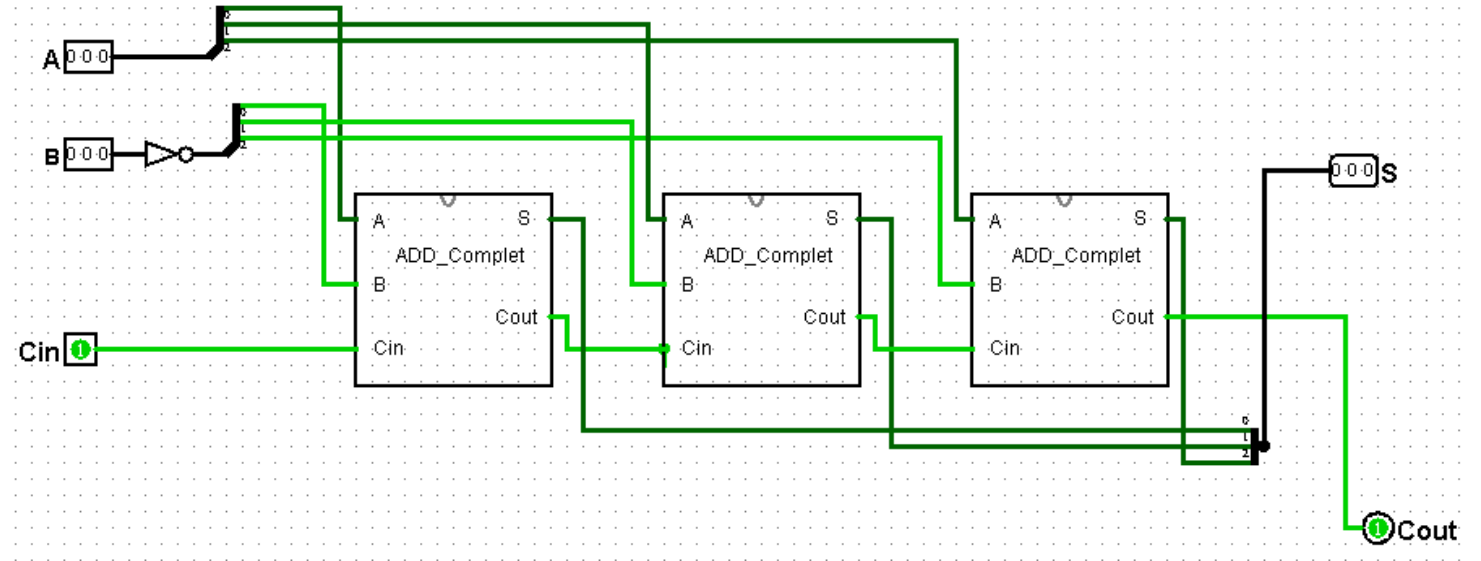
| A | B | Cin | S | Cout |
|---|---|-----|---|------|
| 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 1 | 1 | 0 |
| 0 | 1 | 0 | 1 | 0 |
| 0 | 1 | 1 | 0 | 1 |
| 1 | 0 | 0 | 1 | 0 |
| 1 | 0 | 1 | 0 | 1 |
| 1 | 1 | 0 | 0 | 1 |
| 1 | 1 | 1 | 1 | 1 |



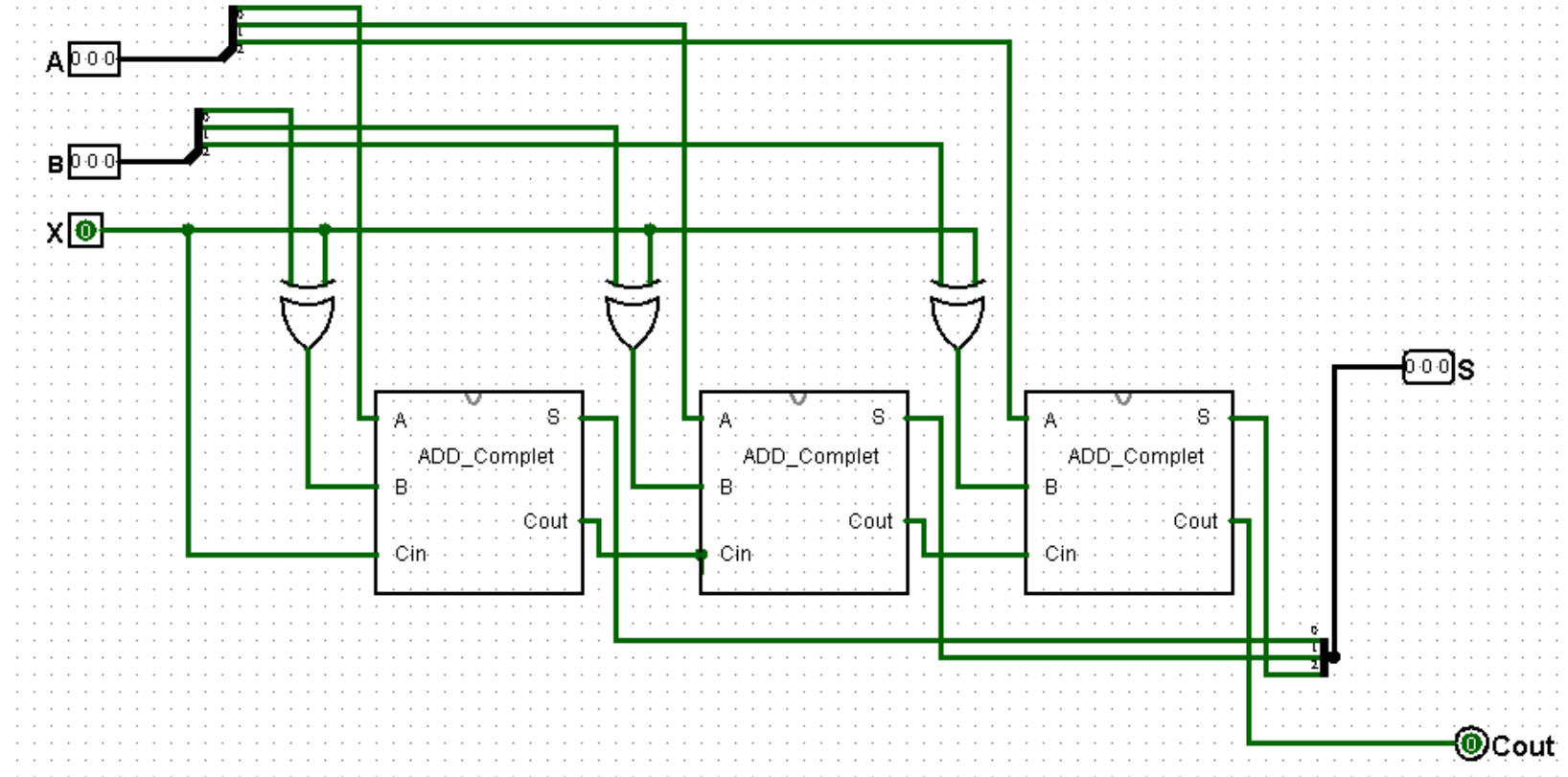
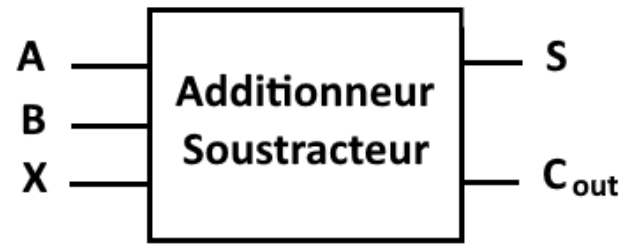
3. Additionneur complet de 3 bits



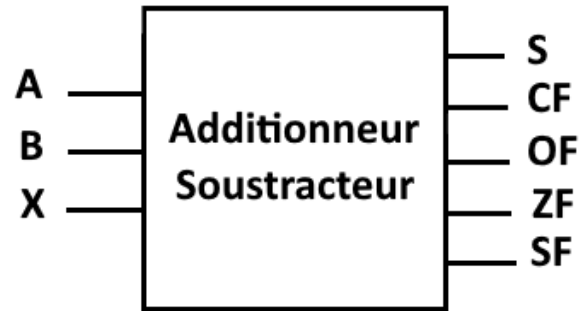
4. Soustracteur de 3 bits



5. Additionneur/Soustracteur 3 bits



6. Additionneur/Soustracteur 3 bits et flags d'états

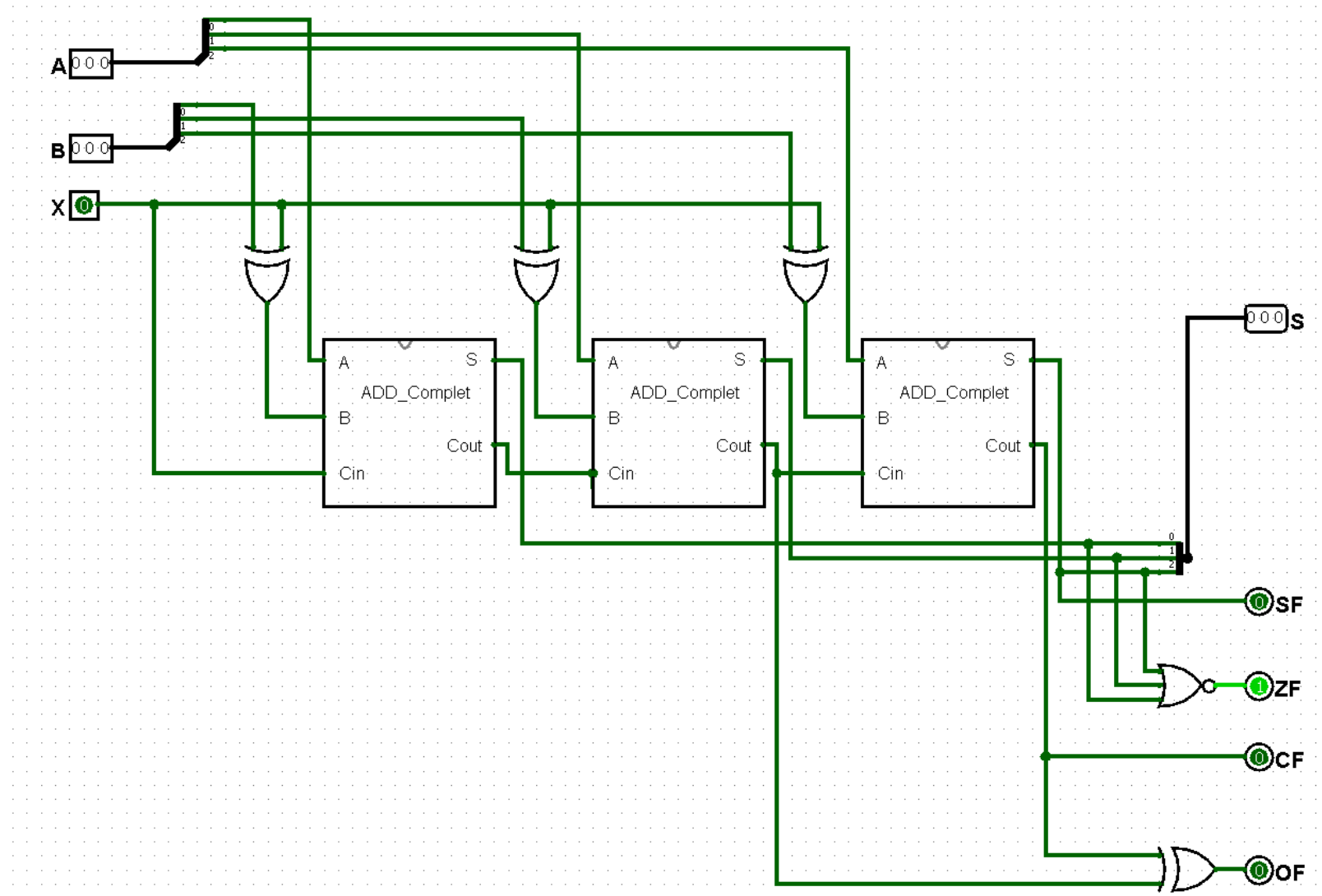


$$SF = S_{n-1}$$

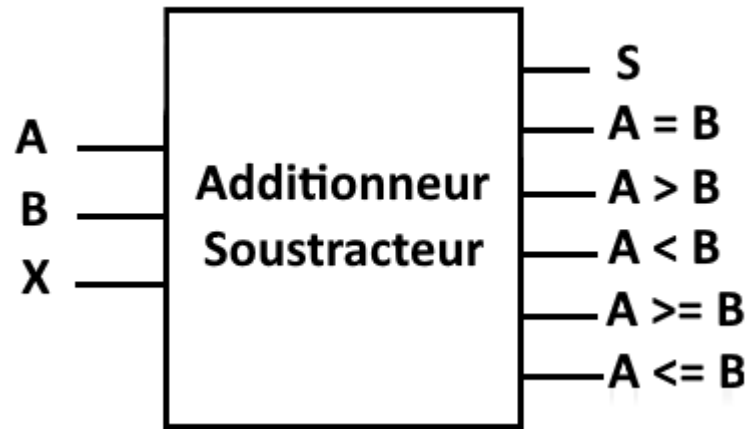
$$CF = Cout_{n-1}$$

$$OF = Cin_{n-1} \oplus Cout_{n-1}$$

$$ZF = \overline{S_0 + S_1 + S_2}$$



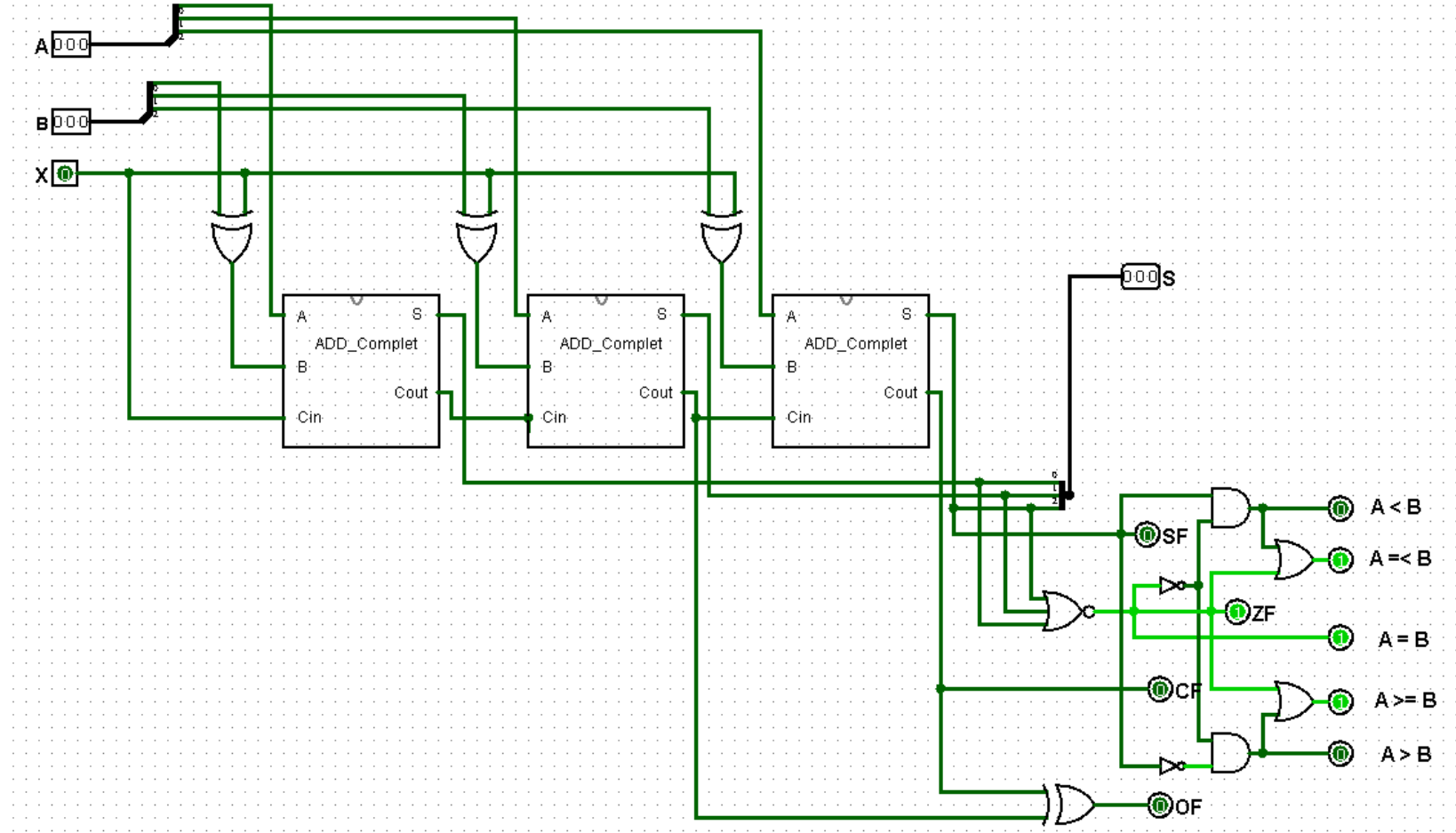
7. Additionneur/Soustracteur 3 bits et les opérations de comparaison



$$A = B \rightarrow ZF$$

$$A < B \rightarrow SF \times \overline{ZF}$$

$$A > B \rightarrow \overline{SF} \times \overline{ZF}$$



8. Multiplicateur de 2 bits

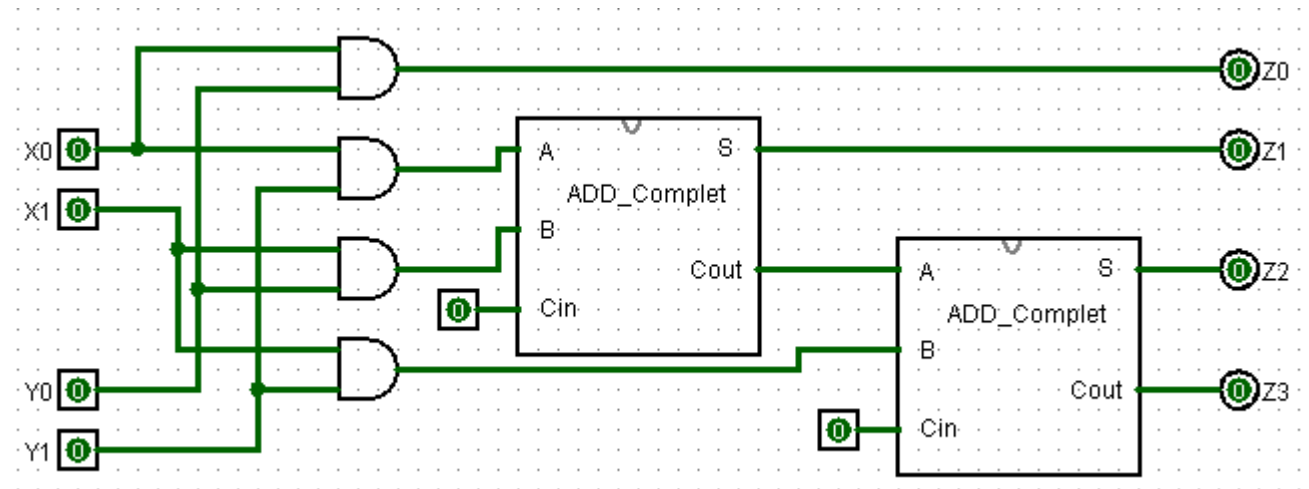
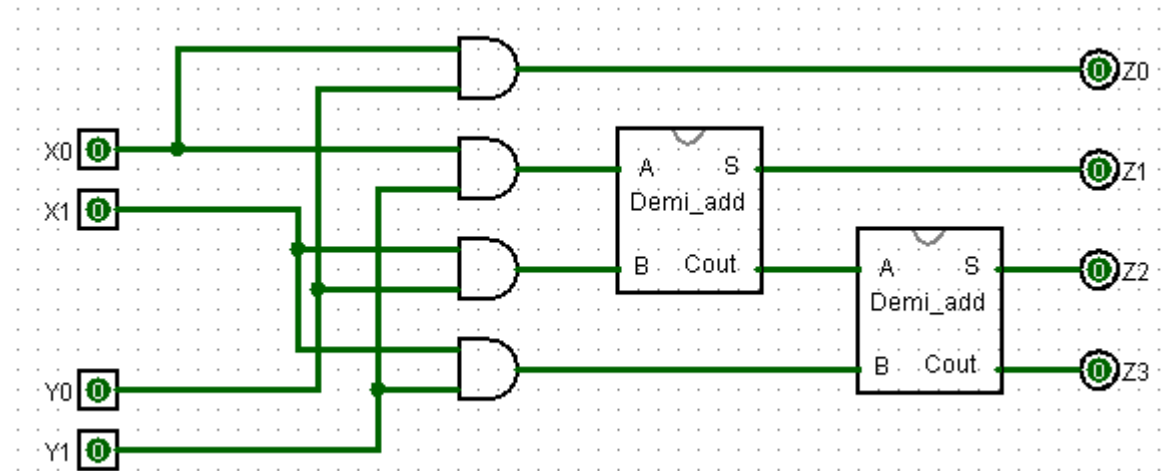


$$Z_0 = X_0 Y_0$$

$$Z_1 = X_0 Y_1 + X_1 Y_0 = A + B$$

$$Z_2 = X_1 Y_1 + Cout_1$$

$$Z_3 = Cout_2$$



A la séance prochaine