**Gebze Technical University**

**Computer Engineering Departman**

**CSE 436 Digital Integrated Circuit**

**Homework #2**

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**Note: 1 bit adder works without errors. Full adder makes a total of mistakes.**

**1 Bit Adder Truth Table**

+---+---+-----+-----+------+

| A | B | Cin | Sum | 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 |

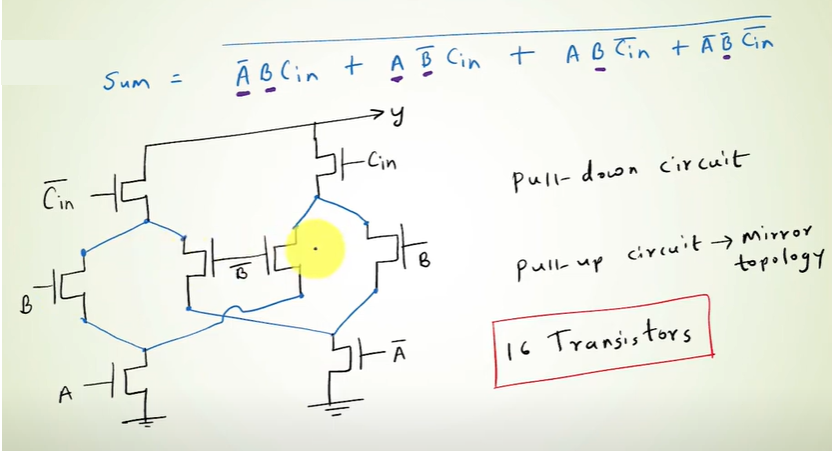
+---+---+-----+-----+------+

| 1 | 1 | 1 | 1 | 1 |

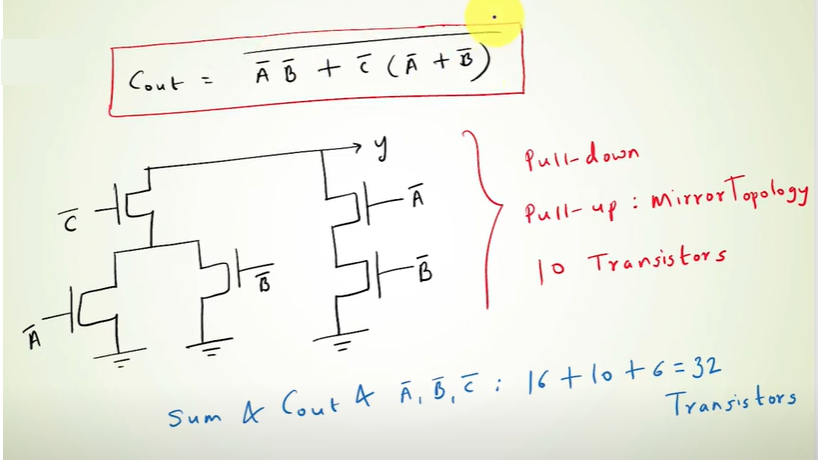
+---+---+-----+-----+------+

**Transistor Desing**

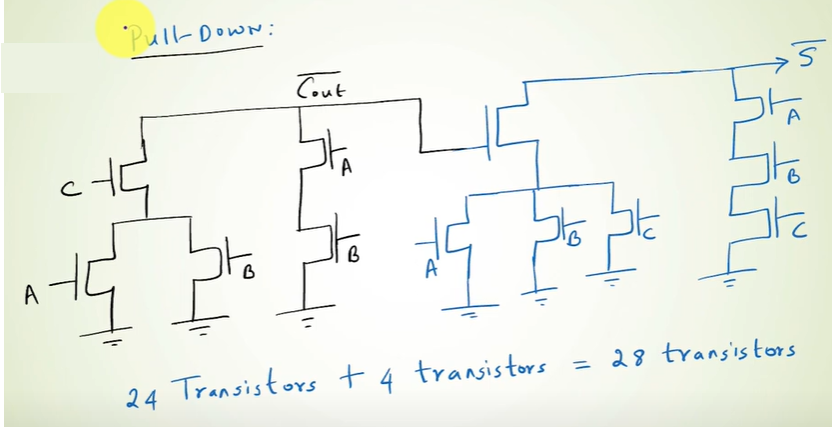
*Sum*=*ABCin*​+*ABCin*​+*ABCin*​​+*ABCin*​​

****

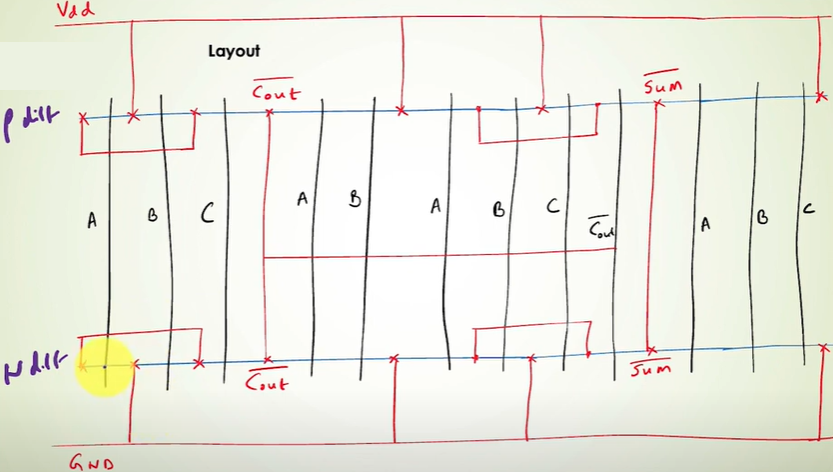
*Cout*=*AB*+*BCin*​+*ACin*​



**Transistors Diagram(Pull Down Network)**

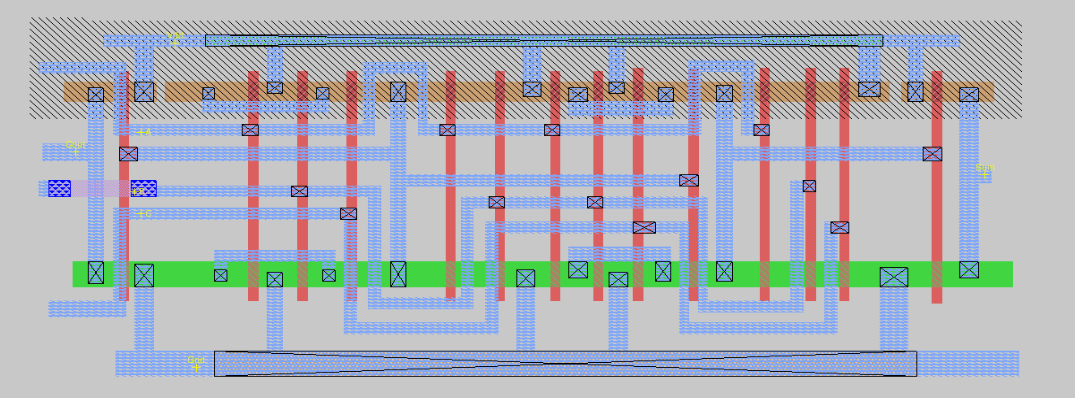


**Stick Diagram**

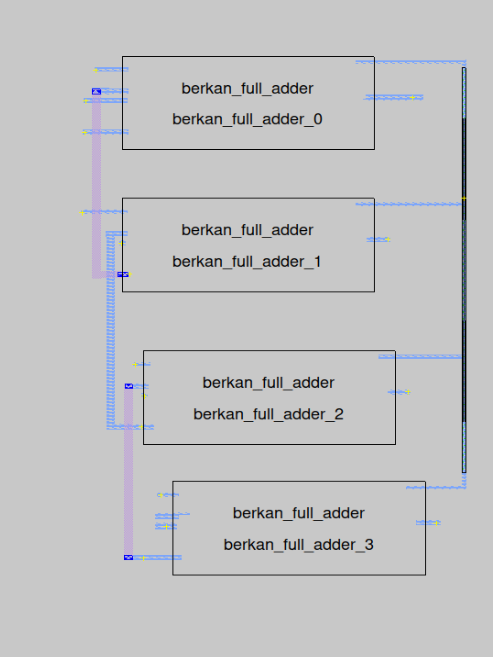


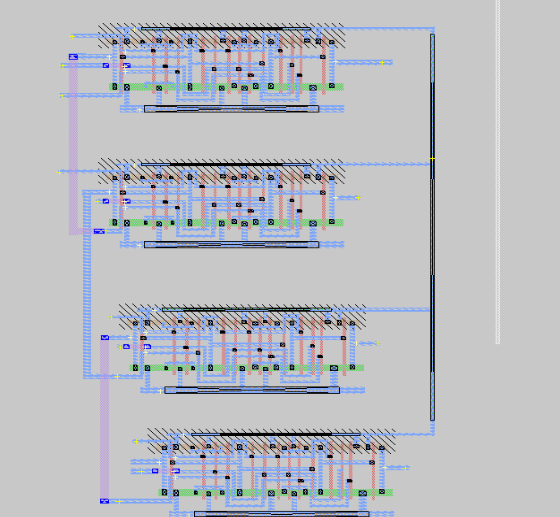
**Magic Desing**

1. **Bit Full Adder**



**4 Bit Full Adder**



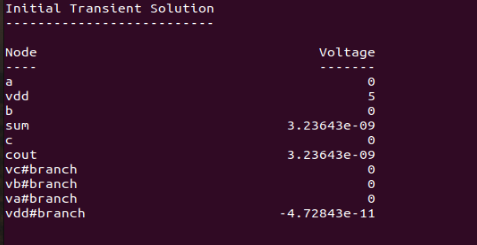
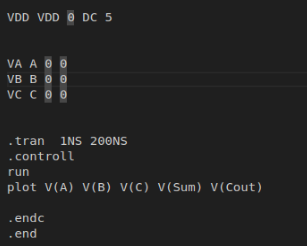


**Test Case**

**1 Bit Full Adder**

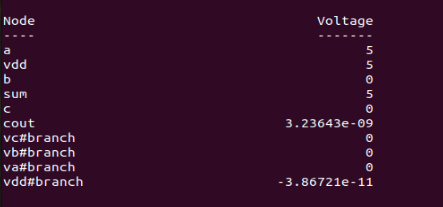
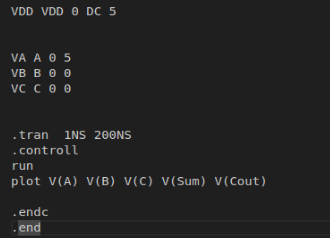
**A B C | Sum Cout**

**0 0 0 | 0 0**

** **

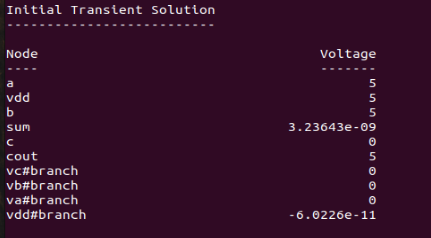
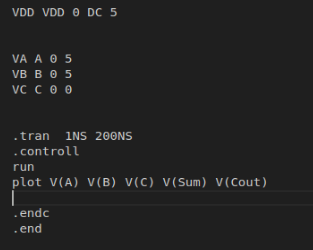
**A B C | Sum Cout**

**1 0 0 | 1 0**

** **

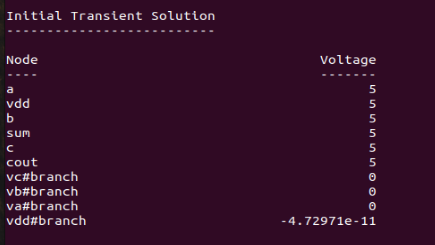
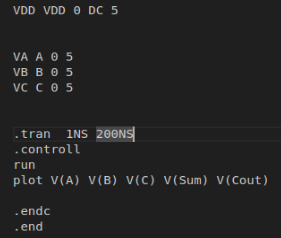
**A B C | Sum Cout**

**1 1 0 | 0 1**

** **

**A B C | Sum Cout**

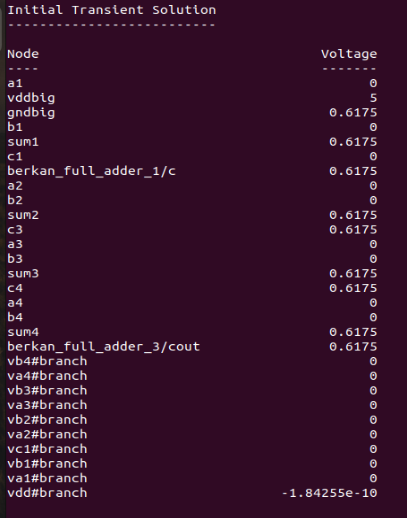
**1 1 1 | 1 1**

** **

**4 Bit Full Adder**

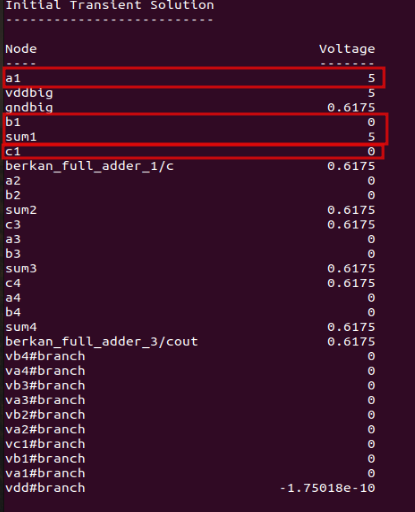
**A4 A3 A2 A1 + B4 B3 B2 B1 = Sum4 Sum3 Sum2 Sum1**

**0000 + 0000 = 0000**

** **

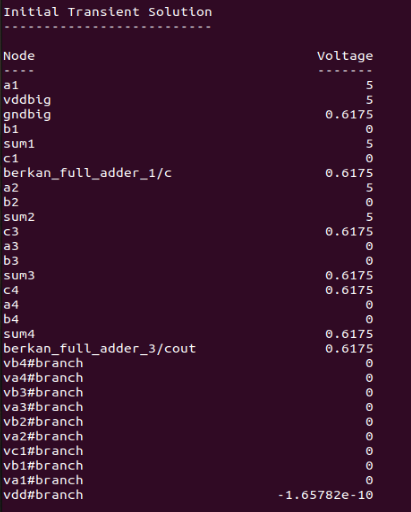
**A4 A3 A2 A1 + B4 B3 B2 B1 = Sum4 Sum3 Sum2 Sum1**

**0001 + 0000 = 0001**



**A4 A3 A2 A1 + B4 B3 B2 B1 = Sum4 Sum3 Sum2 Sum1**

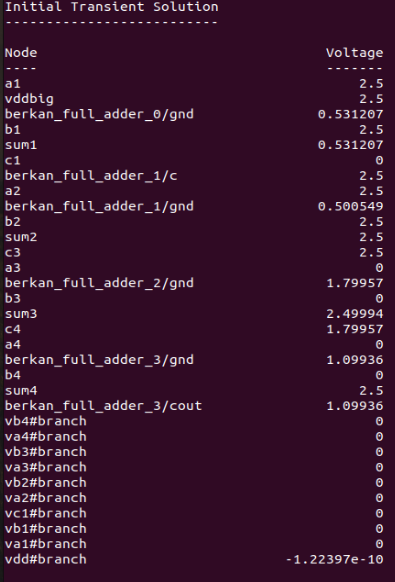
**0011 + 0000 = 0011**

****

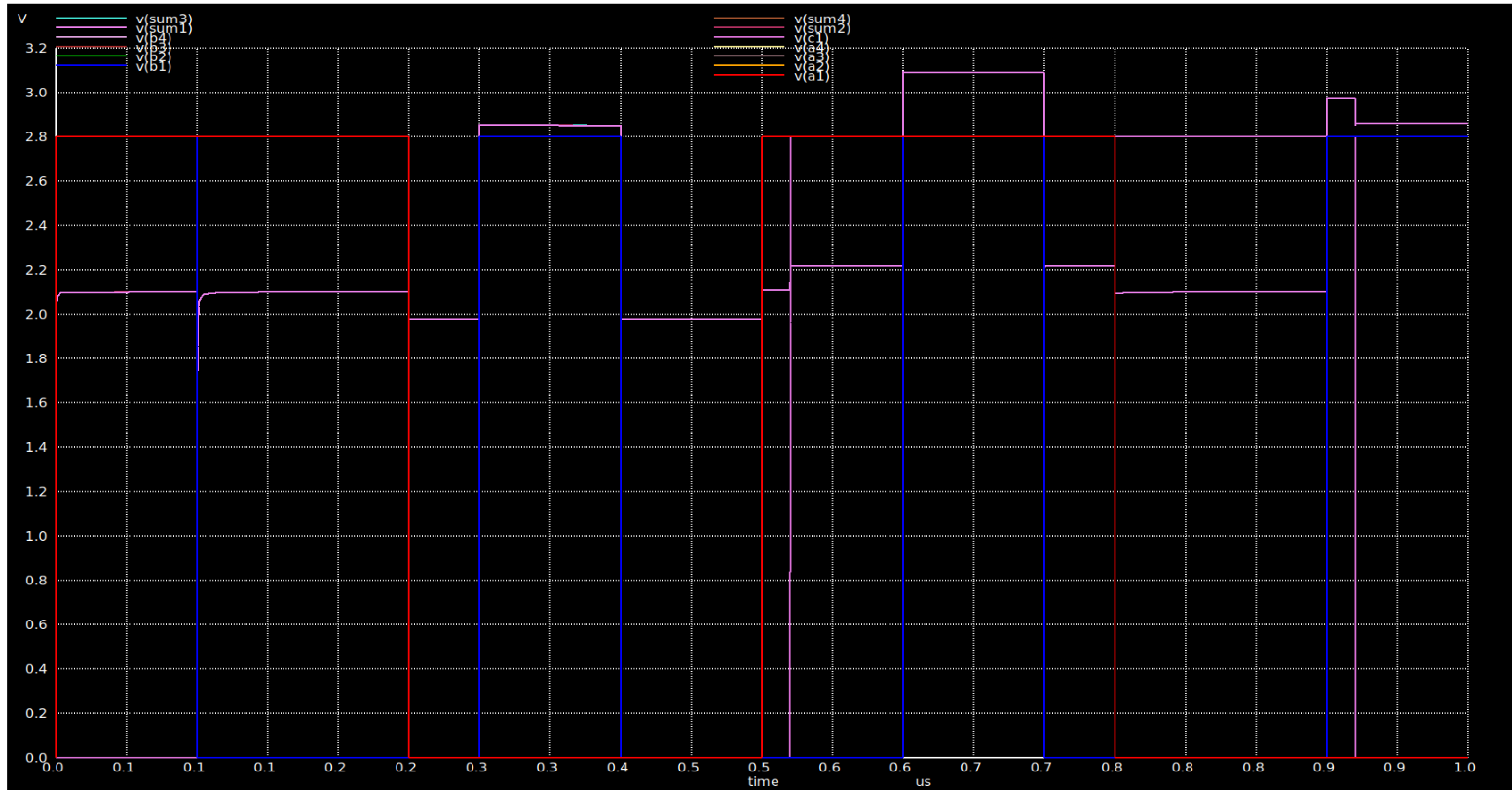
**A4 A3 A2 A1 + B4 B3 B2 B1 = Sum4 Sum3 Sum2 Sum1**

**0011 + 0011 = 0110**

**! It produces wrong results**

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**Meaningless Plot Occurred**

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**Resources**

**https://www.youtube.com/watch?v=N3H-QsGNIiI&t=1317s**