Task 1: Data Rep. and Boolean logic

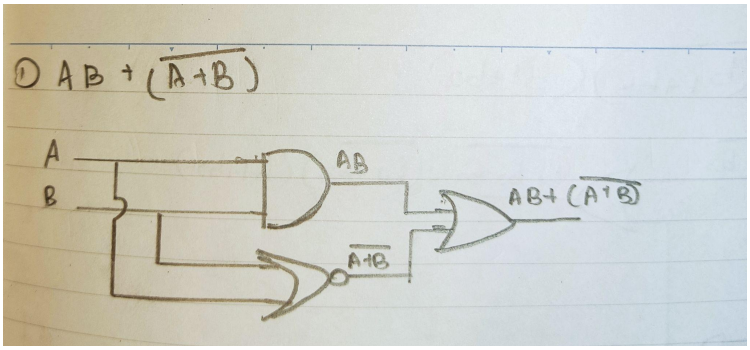
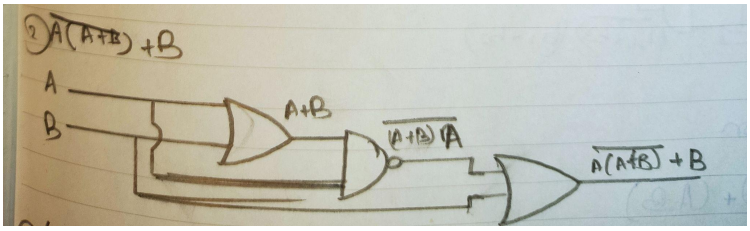
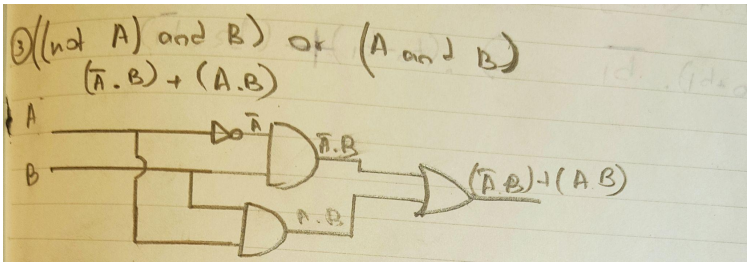
Save this document in your repository for Unit 2 with name:
data_rep_boolean_log.md

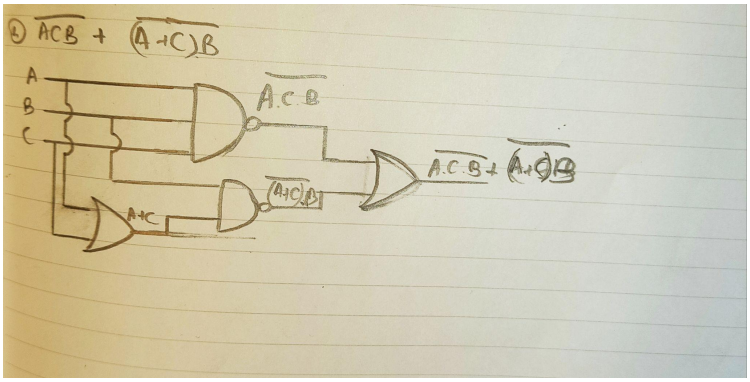
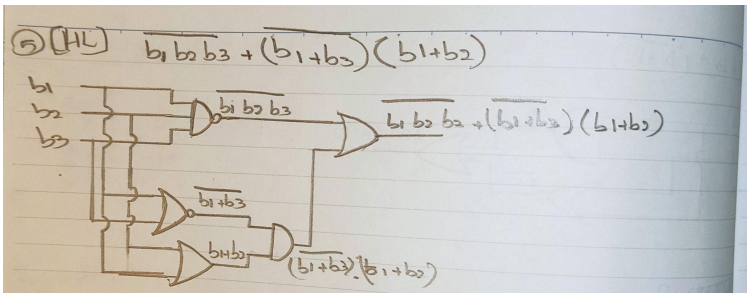
🤔 Resources (Learning Log):

4	Notes Topic 2:	Computer Architecture
5	Boolean Algebra	Video about boolean algebra
6	Examples Base Conversion	Whiteboard notes on conversion of numbers with different bases

Boolean Logic

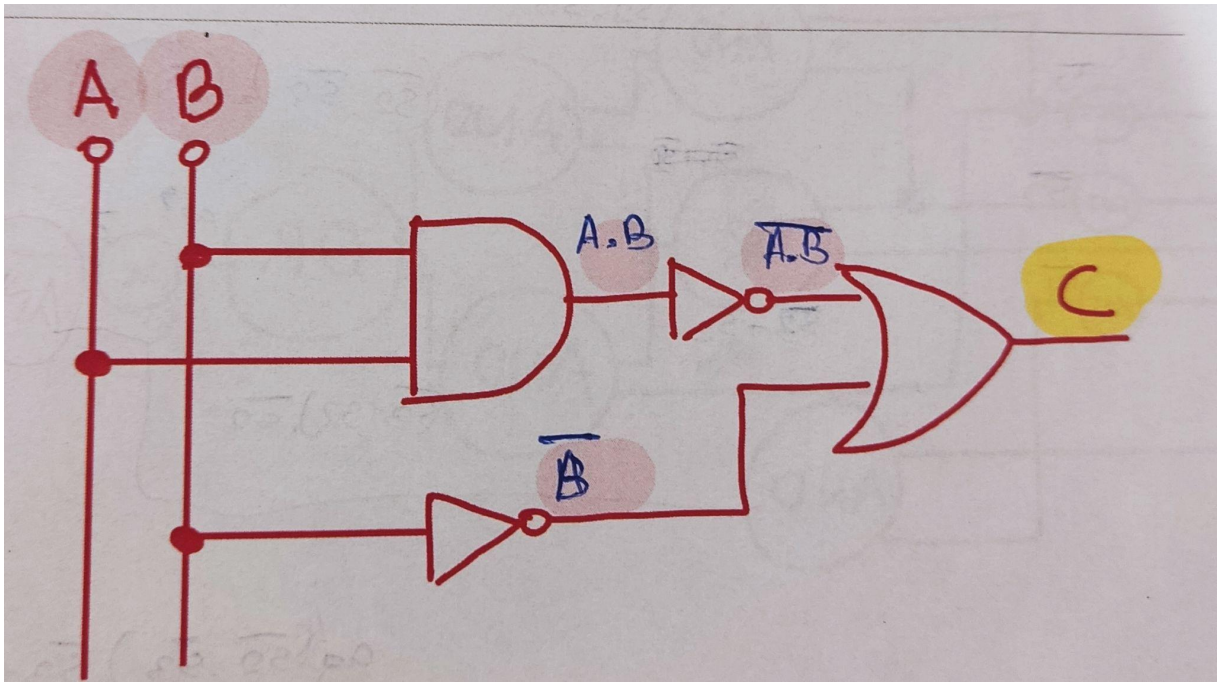
Draw the circuit for the boolean equations provided

Boolean Equation	Circuit
$AB+\overline{(A+B)}$	
$\overline{A(A+B)}+B$	
`((not A) and B) or (A and B)`	

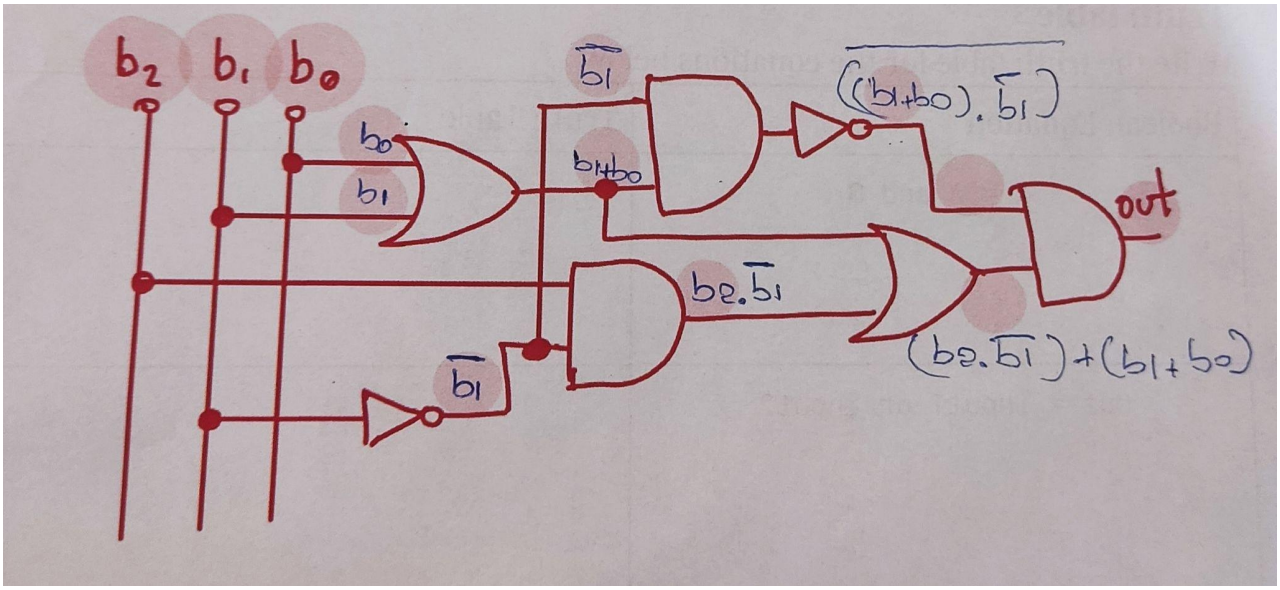
$\overline{ACB} + \overline{(A + C)B}$	
[HL] $\overline{b1b2b3} + \overline{(b1 + b3)}(b1 + b2)$	

Get the Equation

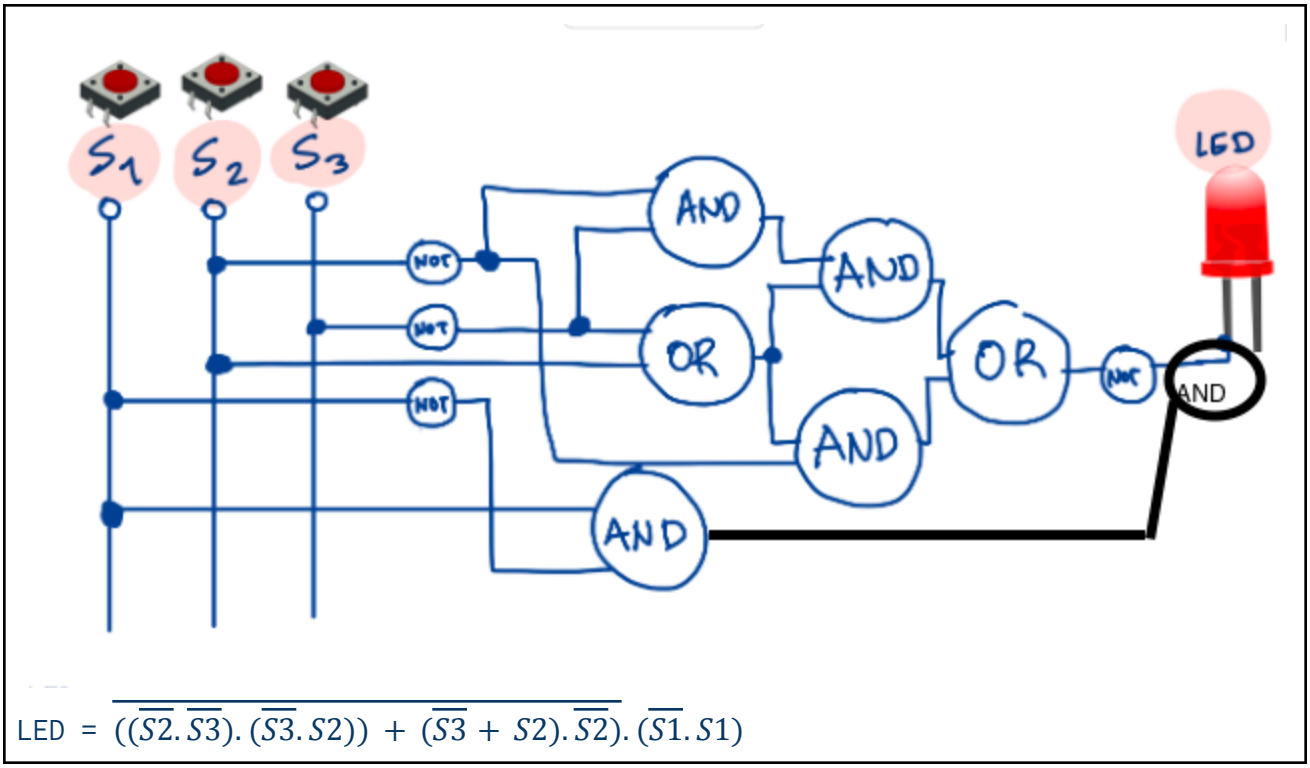
Write the boolean equation for the circuit shown



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



$out = \overline{((b0 + b1).\overline{b1})}.((b0 + b1) + (b2.\overline{b1}))$



$$\text{LED} = \overline{((\overline{S2}.\overline{S3}).(\overline{S3}.S2)) + (\overline{S3} + S2).\overline{S2}).(\overline{S1}.S1)}$$

Truth table

Write the truth table for the equations below

<table>
<tr><th>Boolean Equation</th><th>Truth Table</th></tr>
<tr><td>

```
X = A and B
```

</td><td>

A	B	X
0	0	0
0	1	0
1	0	0
1	1	1

</td></tr>
<tr><td>

```
Out = input1 or input2
```

</td><td>

input1	input2	Out = input1 or input2
0	0	0
0	1	1
1	0	1
1	1	1

</td></tr>
<tr><td>

Light = $\overline{S_1} + \overline{(S_2 + S_3)} + S_1 S_2 \overline{S_3}$

</td><td>

S1	S2	S3	$\overline{S1}$	$\overline{S2 + S3}$	$S1S2\overline{S3}$	Light
0	0	0	1	1	0	1
0	0	1	1	0	0	1
0	1	0	1	0	0	1
0	1	1	1	0	0	1
1	0	0	0	1	0	1
1	0	1	0	0	0	0
1	1	0	0	0	1	1
1	1	1	0	0	0	0

</td></tr>
</table>

[HL]

$$\text{Login} = \overline{P_1 P_2 P_3} + \overline{(P_3 \overline{P_2 P_1})} + \overline{P_1 + P_3}$$

P_1	P_2	P_3	$\overline{P2P1}$	$\overline{P1P2P3}$	$\overline{P3\overline{P2P1}}$	$\overline{P1 + P3}$	Login
0	0	0	1	1	1	1	1
0	0	1	1	1	0	0	1
0	1	0	1	1	1	0	1
0	1	1	0	1	0	0	1
1	0	0	1	1	1	1	1
1	0	1	1	1	0	0	1
1	1	0	1	1	1	0	1
1	1	1	0	0	1	0	1

Data Conversion

Information can be represented in different systems, for example the number `10` in decimal (system base 10) can be represented in binary (system base 2) as `1010` or `12` in base 8.

It is critical for you to understand how to represent information in different ways, this will help you visualize how the computer processes data.

Original Number	Convert to

`256 (Decimal)`	`Base 2 (Binary)`
	`100000000`
	
	`Base 4`
	`10000`
	
	`Base 6`
	`1104`

433 (Base 5)	Base 10 (Decimal) 118 Base 8 (Octal) 166 Base 16 (Hexadecimal) 76
FA32 (Base 16)	Base 10 64050 Base 2 1111101000110010 Base 8 175062