Section 1.8: cont'd

Thursday, October 02, 2014
8:29 AM

Test #1 on Thursday, Oct 16

- covers Assignments 1 & 2 (online and hardcopy)
- Sections 1.1 to 1.10 inclusive
- formula sheet is the Laws of Logic handout

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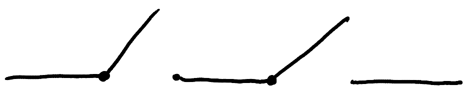
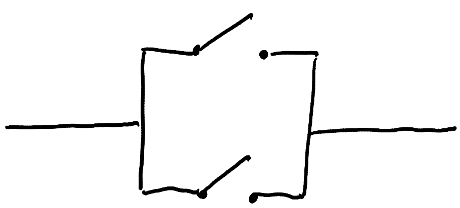
consider the two circuits below:

1



behaves like an "and"
- both switches must be closed ("on") for current to flow

2



behaves like an "or"
- if at least one switch is on, current will flow

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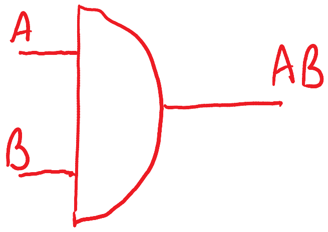
gate representation: (this I will test)

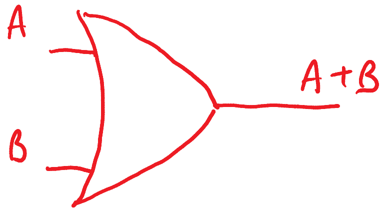
"and"



A and B (you can also write it as $A \cdot B$)

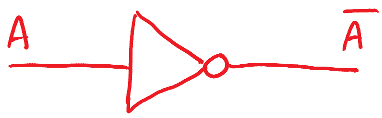
input output

"or"



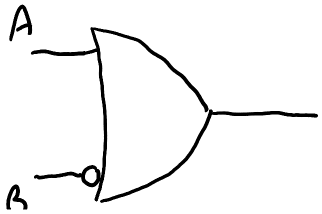
+ means "or"

"not"

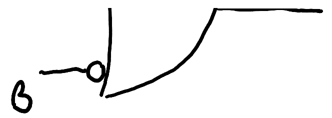


actually, we usually omit the triangle entirely and just use <u>open</u> <u>circles</u> to denote negation

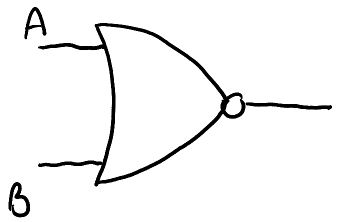
examples: give the output for the following circuits:



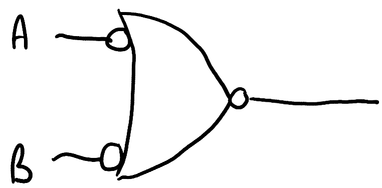
$A + \overline{B}$



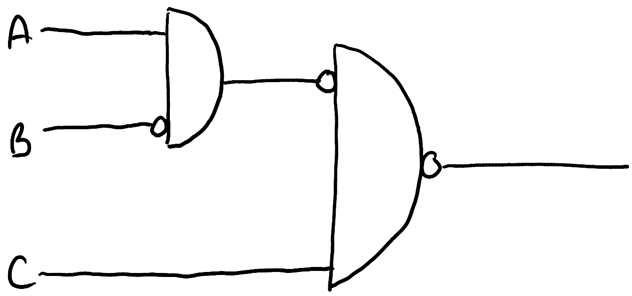
$A + B$



$\overline{A+B}$



$\overline{\overline{A}+\overline{B}}$

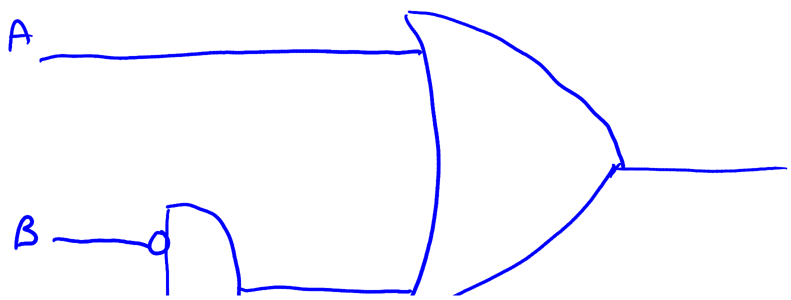


$\overline{\overline{A\overline{B}}\,C}$

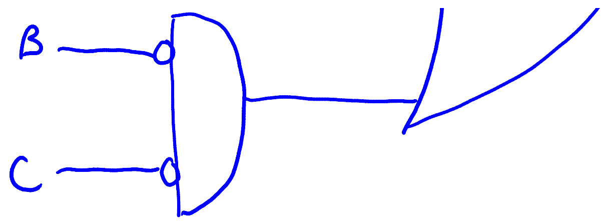
example: draw the gate representation for

$$A + \overline{B}\,\overline{C}$$

note: do the "and" <u>before</u> the "or"



$A + \overline{B}\,\overline{C}$



Boolean Algebra:

algebra in which the variables can only take on one of two possible values: 0 or 1

"and": the symbol is a dot $\cdot$ or implied multiplication

$$A \text{ and } B = A \cdot B = AB$$

"or": the symbol is a plus sign $+$

$$A \text{ or } B = A + B$$

"negation": $\text{not } A = \bar{A}$

order of operations:

"and" before "or"

the negation bar behaves like brackets

<u>and</u> you can use brackets to force the order that you want

examples: which operation comes first?

1. $A + BC$ "and" (then "or")
2. $(A+B)C$ "or" (then "and")
3. $A + \bar{B}C$ "not" (then "and", then "or")
4. $\bar{A}C$ "not" (then "and")
5. $\overline{AC}$ "and" (then "not")

example: write the truth table for $A + \bar{B}\bar{C}$

A	B	C	$\bar{B}$	$\bar{C}$	$\bar{B}\bar{C}$	$A+\bar{B}\bar{C}$
0	0	0	1	1	1	1
0	0	1	1	0	0	0
0	1	0	0	1	0	0
0	1	1	0	0	0	0
1	0	0	1	1	1	1
1	0	1	1	0	0	1
1	1	0	0	1	0	1
1	1	1	0	0	0	1