CS 240 SI Worksheet Solution
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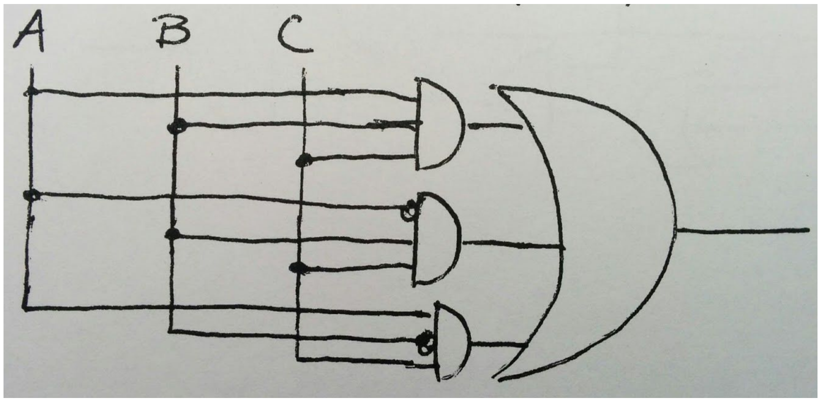
Session #2
1/31/17

Digital Logic (Part 2) + Integer Representation (Part 1)

1. For the following circuit:



a. Write the truth table:

A	**B**	**C**	**output**
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	1
1	1	0	0
1	1	1	1

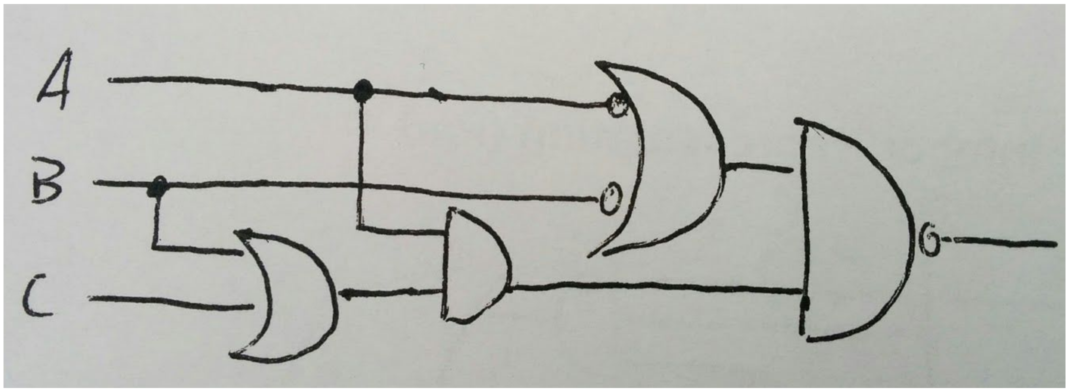
b. Derive the boolean expression in sum-of-products form:

ABC + A'BC + AB'C

c. Simplify your answer from part b using the boolean algebra laws, and write the corresponding law next to each step.

ABC + A'BC + AB'C	**(original)**
(A+A')BC + AB'C	**Distributive**
BC + AB'C	**Inverse/Complements, Identity**
(B + AB')C	**Distributive**
(B+A)(B+B')C	**Distributive**
(B+A)C	**Inverse/Complements, Identity**
(A+B)C	**Commutative**

2. For the following circuit, derive the boolean expression and simplify it (with the laws you used written next to each step).



((A’+B’)(B+C)A)’	
((A’(B+C) + B’(B+C))A)’	**Distributive**
(A’(B+C)A + B’(B+C)A)’	**Distributive**
(AA’(B+C) + B’(B+C)A)’	**Commutative**
(B’(B+C)A)’	**Inverse/Complements, Identity**
(B’BA + B’CA)’	**Distributive**
(B’CA)’	**Inverse/Complements, Identity**
(AB’C)’	**Commutative**

3. What’s **156** (in base 10) in <u>binary</u>?

   10011100

   a. What is it it in <u>hexadecimal</u>?

      0x9C

   b. What is $\mathbf{156_{10} + 00111011_2}$ in <u>binary</u> form?
      (i.e. Don’t use the base 10 number or convert the binary number into base 10...)

      $\mathbf{10011100_2 + 00111011_2 = 11010111_2}$

4. What is **256** in <u>hexadecimal</u>?

   0x100

   a. What is it in <u>binary</u>?

      0x100000000

5. What is $\mathbf{1111_2}$ in <u>hexadecimal</u>?

   0xF