

ET 540 – Introduction to Digital Computing Theory  
HOMEWORK # 4 - Boolean Algebra and DeMorgan's Theorem

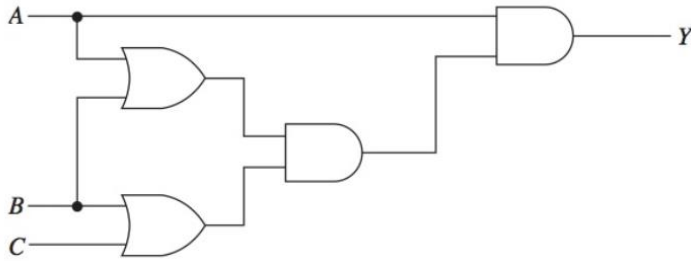
Student's Name \_\_\_\_\_

**Instructions:**

- Show all work to receive full credit

**Boolean Analysis of Logic Circuits**

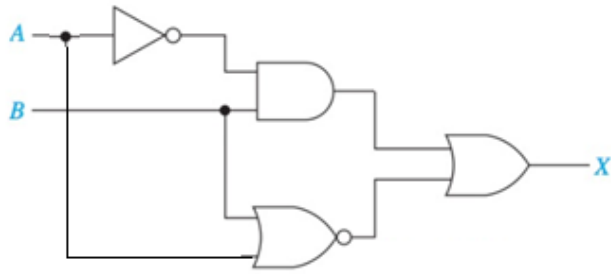
Question 1) Find the output and use Boolean algebra to simplify the output. Also sketch the simplified circuit.



- (4 pts) Output Y \_\_\_\_\_
- (9 pts) Simplified output Y \_\_\_\_\_
- (2 pts) Draw the simplified circuit

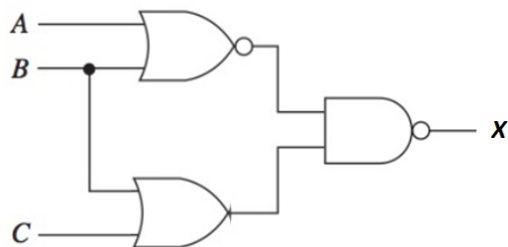
Question 2 and 3) Find the output X and use Boolean algebra and DeMorgan's theorem to simplify the output. Also sketch the simplified circuit.

2.



- (5 pts) Output X \_\_\_\_\_
- (11 pts) Simplified output X \_\_\_\_\_
- (2 pts) Draw the simplified circuit

3.



- (5 pts) Output X \_\_\_\_\_
- (11 pts) Simplified output X \_\_\_\_\_
- (2 pts) Draw the simplified circuit

Question 4) Simplify the following output using Boolean algebra and/or DeMorgan's techniques (11.5 pts a-b, 13 pts c-d)

a.  $X = AB + (\bar{A} + \bar{B})C + AB$

b.  $Z = \bar{A}B + \bar{A}B\bar{C} + \bar{A}BCD + \bar{A}B\bar{C}\bar{D}E$

c.  $W = \overline{\overline{A} + B} \cdot BC + \overline{B}C$

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