

## Review - Boolean algebra, DeMorgan's Theorem, Karnaugh Map, and data control circuits

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

### Instruction:

- Show all work to receive full credit. Box or circle the answer
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### Question 1

Use Boolean algebra to simplify the following expression  $ABC + \overline{A}BC + B\overline{C}$

Sketch the simplified circuit

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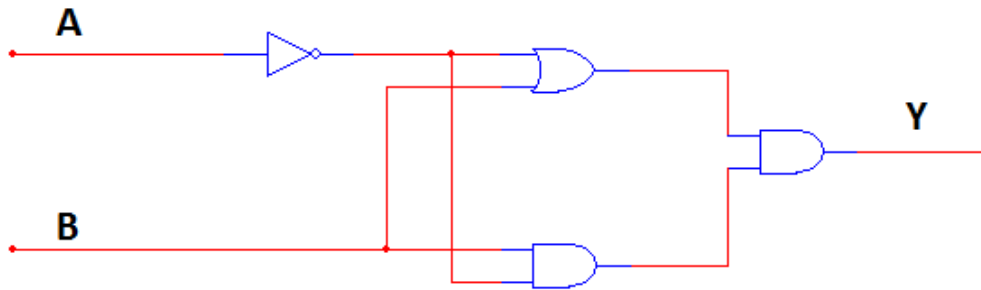
### Question 2

Simplify the following expression using Boolean algebra and DeMorgan's theorem

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

### Question 3

Find and simplify the output Y of the following logic circuit using Boolean algebra

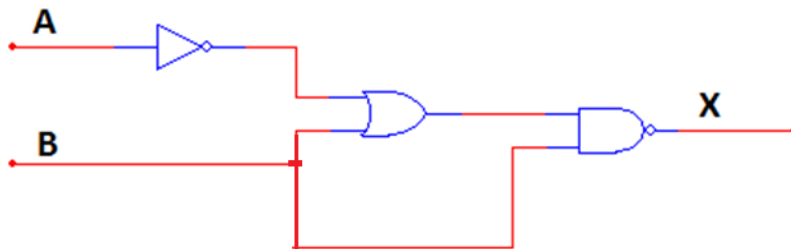


Draw the simplified circuit

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### Question 4

Simplify the output X of the following logic circuit using Boolean algebra and DeMorgan's theorem



### Question 5

Simplify the following Karnaugh Map to its most simplified form:

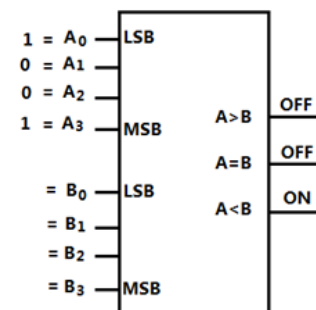
	$\overline{C}\overline{D}$	$C\overline{D}$	$CD$	$\overline{C}D$
$\overline{A}\overline{B}$	1	1	0	1
$\overline{A}B$	0	0	1	1
$AB$	0	0	1	0
$A\overline{B}$	1	1	1	1

### Question 6

Simplify the following SOP output  $X = \overline{A}\overline{B}C + \overline{A}B\overline{C} + A\overline{B}C + ABC$  using K-map

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

### Question 7

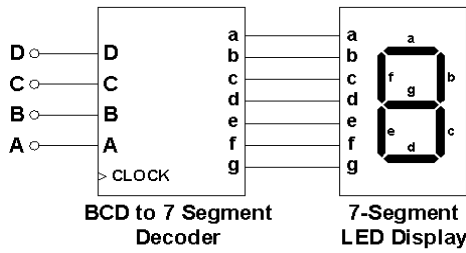


For the following inequality comparator, list all possible inputs for B

### Question 8

Design a logic circuit to decode the binary string  $A=0010_2$ . Assuming that  $A_0$  is the LSB and  $A_3$  is the MSB, write the output equation with respect decoder

### Question 9

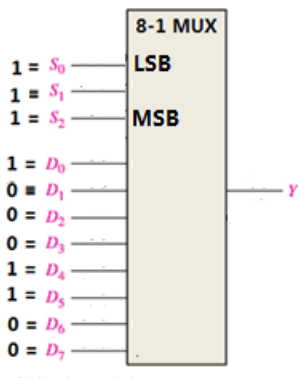


For the following BCD to 7-segment decoder circuit, if we assume that D is the least-Significant-Bit (LSB) and A the Most Significant Bit (MSB)

If we receive the following input, which segment of the 7-segment will be ON? A = 0, B = 0, C = 1, D = 1

Segment that will be ON? Write the segment in alphabetic order \_\_\_\_\_

### Question 10

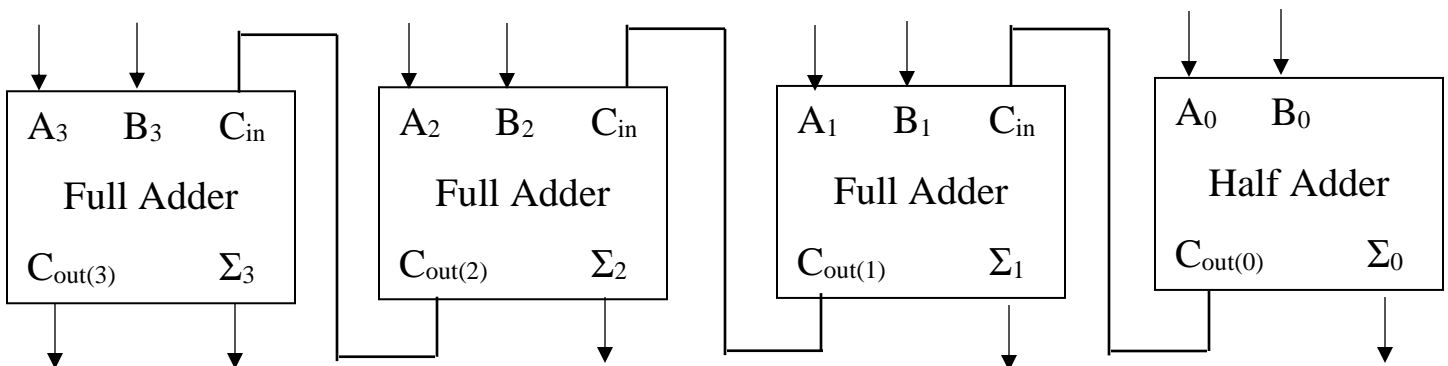


For the following 8-1 MUX, which Data Input is selecting the data selector? \_\_\_\_\_

What would be output Y? \_\_\_\_\_

### Question 11

Having the following input A = 1010<sub>2</sub> and B = 0011<sub>2</sub> through the 4-bit full adder below, what would be the output for  $\Sigma_3$ ,  $\Sigma_2$ ,  $\Sigma_1$ ,  $\Sigma_0$ , and  $C_{out(3)}$



----- Review ends here -----