

## 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

(10 points) Use Boolean algebra to simplify the following expression  $AB\bar{C} + \bar{A}BC + B\bar{C}$

(5 pts) Sketch the simplified circuit

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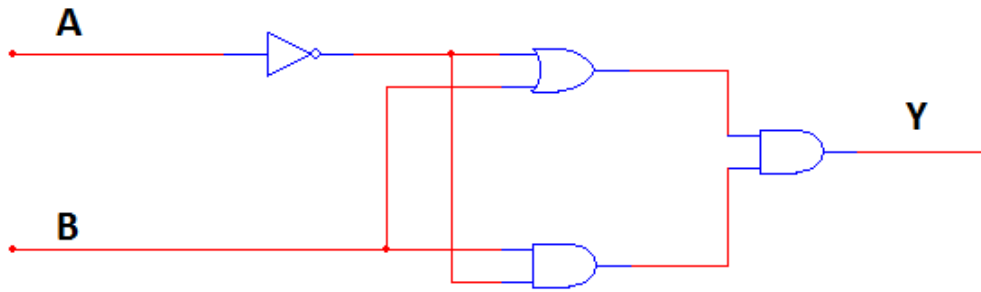
### Question 2

(9 points) Simplify the following expression using Boolean algebra and DeMorgan's theorem

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

### Question 3

(10 points) Find and simplify the output Y of the following logic circuit using Boolean algebra

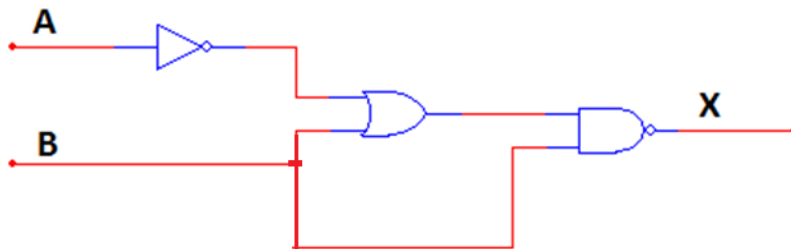


(5 points) Draw the simplified circuit

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### Question 4

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



### Question 5

(9 points) Simplify the following Karnaugh Map to its most simplified form:

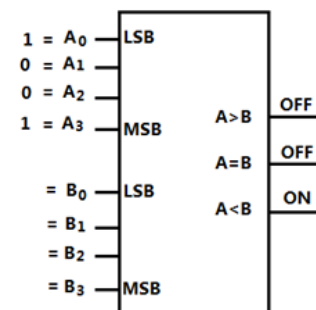
	$\overline{C}\overline{D}$	$C\overline{D}$	$CD$	$\overline{C}D$
$\overline{A}\overline{B}$	1	1	0	1
$\overline{A}B$	0	0	1	1
$AB$	0	0	1	0
$A\overline{B}$	1	1	1	1

### Question 6

(6 points) 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

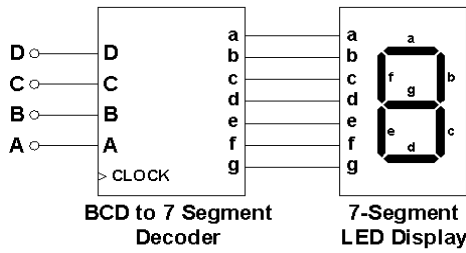


(8 points) For the following inequality comparator, list all possible inputs for B

### Question 8

(8 points) 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

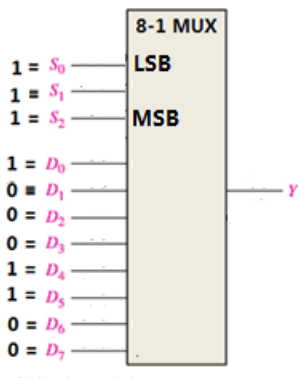


For the following BCD to 7-segment decoder circuit, if we assume that D is the least-Significant-Bit (LSB) and A the Most Significant Bit (MSB)

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

(6 points) Segment that will be ON \_\_\_\_\_

### Question 10

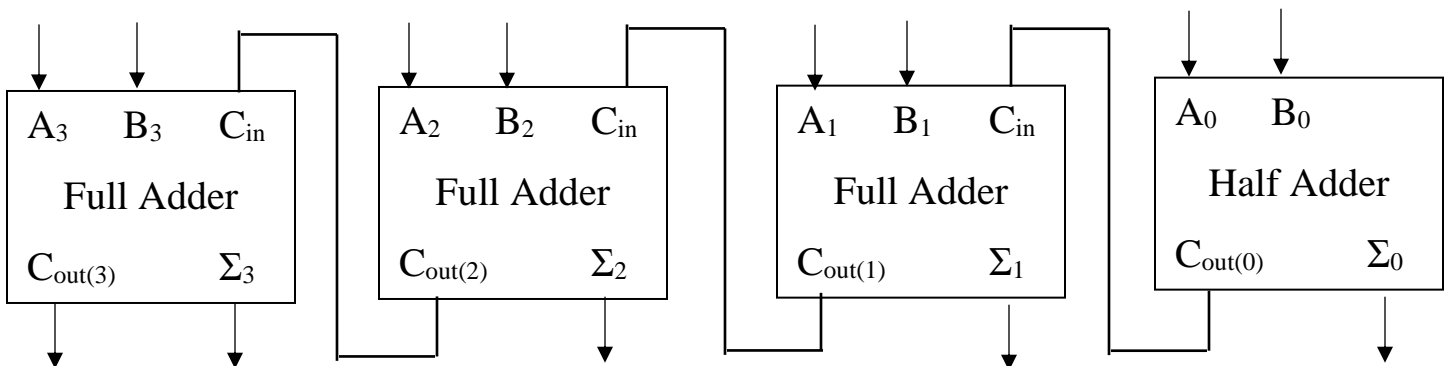


(4 points) For the following 8-1 MUX, which Data Input is selecting the data selector? \_\_\_\_\_

(4 points) What would be output Y? \_\_\_\_\_

### Question 11

(7 points) 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 -----