

HW8: Boolean algebra, digital logic and combinational circuits (CS220-03)

For Boolean algebra expressions 1 through 4, complete the truth table to determine its output column.

1) $V(A, B) = A + \bar{A}B$

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

2) $W(A, B, C) = B\bar{C} \oplus A\bar{B}$

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

3) $X(A, B, C) = \overline{ABC} + \overline{\overline{B}C}$

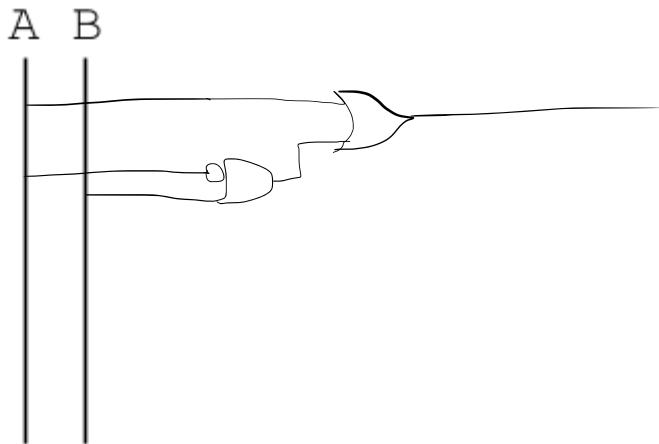
A	B	C	\bar{C}	$A\bar{B}\bar{C}$	\bar{B}	$\bar{B}C$	$\bar{B}\bar{C}$	$A\bar{B}\bar{C} + \bar{B}\bar{C}$	$A\bar{B}\bar{C} + \overline{\bar{B}C}$
0	0	0	1	0	1	0	1	1	1
0	0	1	0	0	1	1	0	0	0
0	1	0	1	0	0	0	1	1	1
0	1	1	0	0	0	1	1	1	1
1	0	0	0	0	1	0	1	1	1
1	0	1	1	0	1	1	0	1	1
1	1	0	1	0	0	1	0	1	1
1	1	1	0	0	0	0	1	0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

4) $Y(A, B, C, D) = BD + \overline{\overline{AC} \oplus D}$

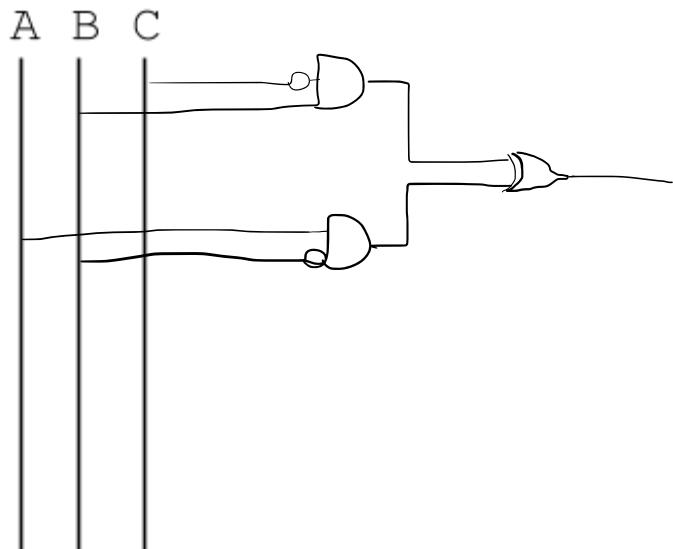
A	B	C	D	BD	$\bar{A}\bar{C}$	$\bar{A}\bar{C} \oplus D$	$\overline{\bar{A}\bar{C} \oplus D}$	$\overline{\bar{A}\bar{C} \oplus D} + BD$
0	0	0	0	0	1	0	1	1
0	0	0	1	0	1	1	0	0
0	0	1	0	0	1	1	0	0
0	0	1	1	0	1	0	1	1
0	1	0	0	0	0	0	1	1
0	1	0	1	0	0	1	1	1
0	1	1	0	0	0	1	1	1
0	1	1	1	0	0	0	1	0
1	0	0	0	0	1	0	1	1
1	0	0	1	0	1	1	0	0
1	0	1	0	0	0	1	1	1
1	0	1	1	0	0	0	1	0
1	1	0	0	0	0	0	1	1
1	1	0	1	0	0	1	1	1
1	1	1	0	0	0	0	1	0
1	1	1	1	0	0	0	1	0

For Boolean algebra expressions 5 through 8, draw the equivalent digital logic circuit.

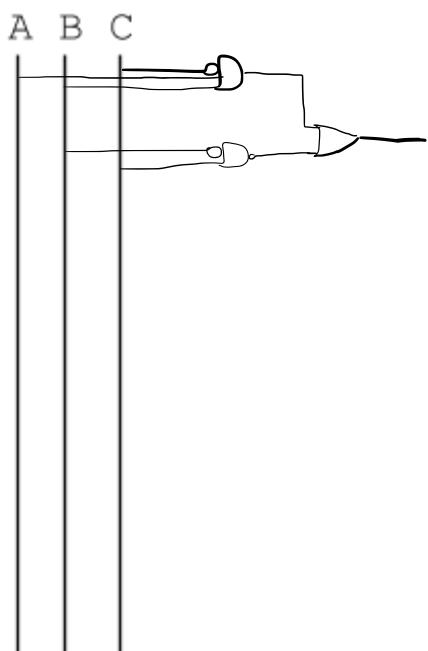
5) $V(A, B) = A + \overline{AB}$



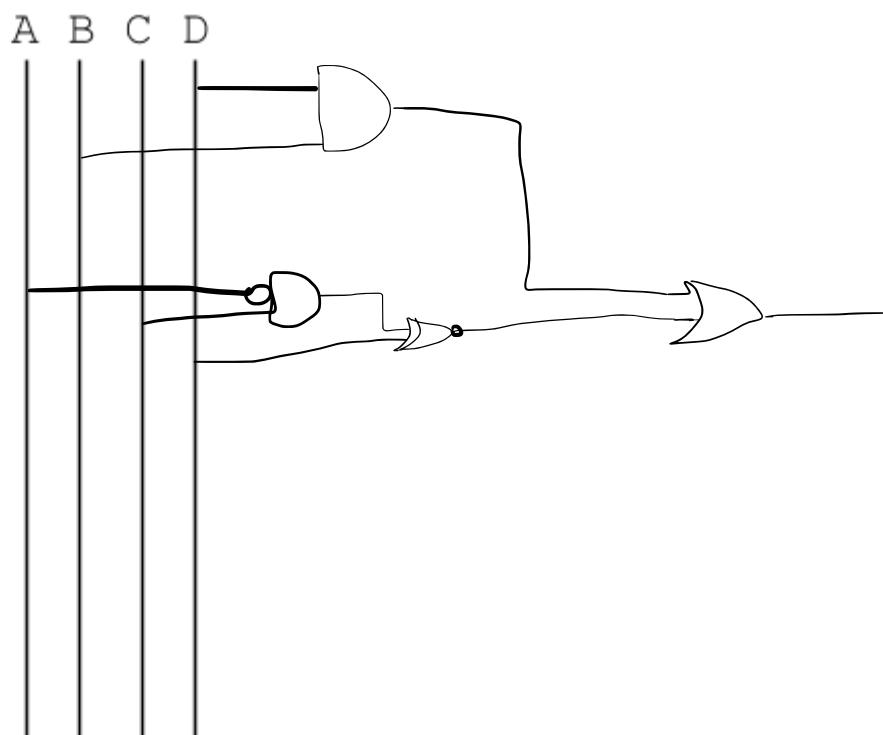
6) $W(A, B, C) = B\overline{C} \oplus A\overline{B}$



7) $X(A, B, C) = \overline{ABC} + \overline{\overline{B}}\overline{C}$

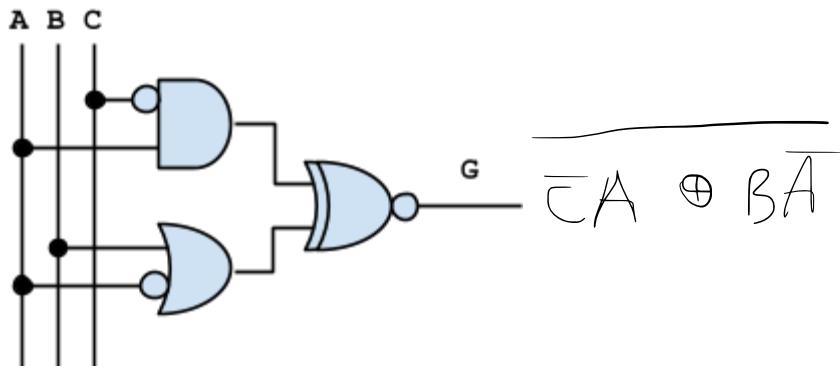


8) $Y(A, B, C, D) = BD + \overline{AC} \oplus D$

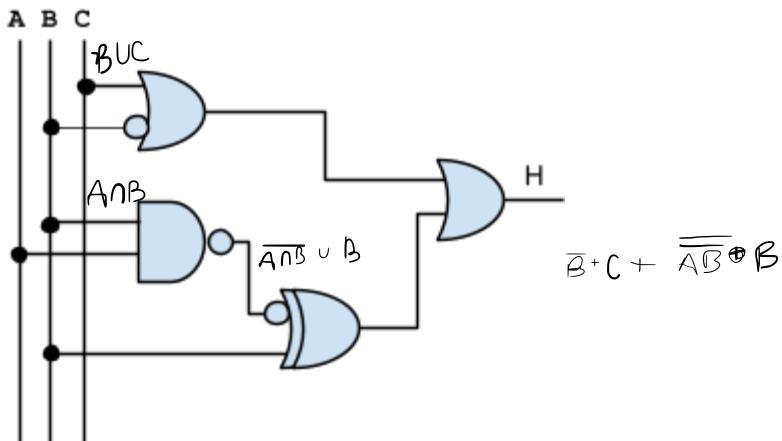


For digital logic circuits 9 through 11, write the equivalent Boolean algebra expression (the most direct translation of the circuit... no optimization, for example).

9)



10)



11)

