

## Section 1.7 Answers

1.

A	A	$A \cap A$
0	0	0
1	1	1

2.

A	U	$A \cup U$
0	1	1
1	1	1

3.

A	$\emptyset$	$A \cap \emptyset$
0	0	0
1	0	0

4.

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

5.

A	B	$A \cup B$	$\overline{A \cup B}$
0	0	0	1
0	1	1	0
1	0	1	0
1	1	1	0

6.

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

7.

A	B	$A \cup B$	$A \cap (A \cup B)$
0	0	0	0
0	1	1	0
1	0	1	1
1	1	1	1

8.

A	B	C	$B \cap C$	$\bar{A}$	$\bar{A} \cup (B \cap C)$
0	0	0	0	1	1
0	0	1	0	1	1
0	1	0	0	1	1
0	1	1	1	1	1
1	0	0	0	0	0
1	0	1	0	0	0
1	1	0	0	0	0
1	1	1	1	0	1

9.

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

10.

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

11.

A	B	$\bar{A}$	$\bar{B}$	$\bar{A} \cup B$	$A \cap \bar{B}$	$\bar{A} \cup B \cup (A \cap \bar{B})$
0	0	1	1	1	0	1
0	1	1	0	1	0	1
1	0	0	1	0	1	1
1	1	0	0	1	0	1

12.

A	B	C	$\bar{B}$	$\bar{C}$	$A \cap \bar{B} \cap \bar{C}$	$A \cap \bar{B} \cap C$	$(A \cap \bar{B} \cap \bar{C}) \cup (A \cap \bar{B} \cap C)$
0	0	0	1	1	0	0	0
0	0	1	1	0	0	0	0
0	1	0	0	1	0	0	0
0	1	1	0	0	0	0	0
1	0	0	1	1	1	0	1
1	0	1	1	0	0	1	1
1	1	0	0	1	0	0	0
1	1	1	0	0	0	0	0

13. No, because the 4<sup>th</sup> and 7<sup>th</sup> columns are not the same.

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

14. Yes, because the 4<sup>th</sup> and 7<sup>th</sup> columns are identical.

A	B	$A \cup B$	$\overline{A \cup B}$	$\overline{A}$	$\overline{B}$	$\overline{A \cap B}$
0	0	0	1	1	1	1
0	1	1	0	1	0	0
1	0	1	0	0	1	0
1	1	1	0	0	0	0

15. No, because the 5<sup>th</sup> and last columns are not identical.

A	B	C	$B \cap C$	$A \cup (B \cap C)$	$A \cup B$	$(A \cup B) \cap C$
0	0	0	0	0	0	0
0	0	1	0	0	0	0
0	1	0	0	0	1	0
0	1	1	1	1	1	1
1	0	0	0	1	1	0
1	0	1	0	1	1	1
1	1	0	0	1	1	0
1	1	1	1	1	1	1

16. Yes, because the first and last columns are identical.

A	B	$A \cap B$	$A \cup (A \cap B)$
0	0	0	0
0	1	0	0
1	0	0	1
1	1	1	1

17. No, because the last two columns are not identical. (But it **is** true that  $A \cap (\overline{A \cup B})$  is equal to the **intersection** of A and B.)

A	B	$\overline{A}$	$\overline{A \cup B}$	$A \cap (\overline{A \cup B})$	$A \cup B$
0	0	1	1	0	0
0	1	1	1	0	1
1	0	0	0	0	1
1	1	0	1	1	1

18. Yes, because the 5<sup>th</sup> and last columns are identical.

A	B	C	$A \cup B$	$(A \cup B) \cup C$	$B \cup C$	$A \cup (B \cup C)$
0	0	0	0	0	0	0
0	0	1	0	1	1	1
0	1	0	1	1	1	1
0	1	1	1	1	1	1
1	0	0	1	1	0	1
1	0	1	1	1	1	1
1	1	0	1	1	1	1
1	1	1	1	1	1	1