

## 2.15.1. Semantic Problems: Truth Table Completion

Use the semantic rules for Negation, Conjunction, and Disjunction to **complete** each of the following truth tables.

**Negation Rule**

▲	$\sim \text{▲}$
1	0
0	1

**Conjunction Rule**

●	▲	$(\bullet \wedge \blacktriangle)$
1	1	1
1	0	0
0	1	0
0	0	0

**Disjunction Rule**

●	▲	$(\bullet \vee \blacktriangle)$
1	1	1
1	0	1
0	1	1
0	0	0

1.

P	Q	$(P \vee Q)$	$(P \wedge (P \vee Q))$
1	1		
1	0		
0	1		
0	0		

2.

P	Q	$\sim P$	$(\sim P \wedge Q)$	$(P \vee (\sim P \wedge Q))$
1	1			
1	0			
0	1			
0	0			

**Negation Rule**

$\blacktriangle$	$\sim\blacktriangle$
1	0
0	1

**Conjunction Rule**

$\bullet$	$\blacktriangle$	$(\bullet \wedge \blacktriangle)$
1	1	1
1	0	0
0	1	0
0	0	0

**Disjunction Rule**

$\bullet$	$\blacktriangle$	$(\bullet \vee \blacktriangle)$
1	1	1
1	0	1
0	1	1
0	0	0

**3.**

P	Q	$(P \vee Q)$	$(P \wedge Q)$	$\sim(P \wedge Q)$	$((P \vee Q) \wedge \sim(P \wedge Q))$
1	1				
1	0				
0	1				
0	0				

**4.**

P	Q	R	$(P \wedge Q)$	$\sim R$	$((P \wedge Q) \vee \sim R)$
1	1	1			
1	1	0			
1	0	1			
1	0	0			
0	1	1			
0	1	0			
0	0	1			
0	0	0			