

1. 证明下列公式是重言式

(1) $(A \rightarrow (B \rightarrow C)) \rightarrow ((A \rightarrow B) \rightarrow (A \rightarrow C))$ (1-1)

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

由表中可以看出, $\neg((A \rightarrow (B \rightarrow C)) \rightarrow ((A \rightarrow B) \rightarrow (A \rightarrow C))) = 1$, 所以是重言式

(2) $(\neg A \rightarrow \neg B) \rightarrow (B \rightarrow A)$

A	B	$\neg A$	$\neg B$	$\neg A \rightarrow \neg B$	$B \rightarrow A$	$(\neg A \rightarrow \neg B) \rightarrow (B \rightarrow A)$
0	0	1	1	1	1	1
0	1	1	0	0	0	1
1	0	0	1	1	1	1
1	1	0	0	1	1	1

由表中可以看出, $\neg((\neg A \rightarrow \neg B) \rightarrow (B \rightarrow A)) = 1$, 所以是重言式

2. 证明下列公式成立.

(1) $(A \wedge B) \rightarrow C = (A \rightarrow C) \vee (B \rightarrow C)$

A	B	C	$A \vee B$	$A \vee B \rightarrow C$	$A \rightarrow C$	$B \rightarrow C$	$(A \rightarrow C) \vee (B \rightarrow C)$
0	0	0	0	1	1	1	1
0	0	1	0	1	1	1	1
0	1	0	1	0	1	0	1
0	1	1	1	1	1	1	1
1	0	0	1	0	0	1	1
1	0	1	1	1	1	1	1
1	1	0	1	0	0	0	0
1	1	1	1	1	1	1	1

因为真值等价
所以逻辑等价.