

1)  $(A \rightarrow C) \vee (B \rightarrow C) \stackrel{?}{=} (A \vee B) \rightarrow C$

a)  ~~$A \quad B \quad C \quad A \rightarrow C \quad B \rightarrow C$~~

A	B	C	$A \rightarrow C$	$B \rightarrow C$	<del><math>A \vee B</math></del>	$A \vee B$	$(A \vee B) \rightarrow C$
F	F	F	T	T	F	F	T
F	F	T	T	T	F	T	T
F	T	F	T	F	T	F	F
F	T	T	T	T	T	T	T
T	F	F	F	T	T	F	F
T	F	T	T	T	T	T	T
T	T	F	F	F	T	F	F
T	T	T	T	T	T	T	yes

b)  $(A \rightarrow C) \vee (B \rightarrow C) \stackrel{?}{=} (A \wedge B) \rightarrow C$

A	B	C	$A \rightarrow C$	$B \rightarrow C$	$A \wedge B$	$(A \wedge B) \rightarrow C$
F	F	F	T	T	F	T
F	F	T	T	T	F	T
F	T	F	T	F	F	T
F	T	T	T	T	F	T
T	F	F	F	T	F	T
T	F	T	T	T	F	T
T	T	F	F	F	T	F
T	T	T	T	T	T	yes

$$c) (A \rightarrow C) \wedge (B \rightarrow C) \stackrel{?}{=} (A \vee B) \rightarrow C$$

A	B	C	$A \rightarrow C$	$B \rightarrow C$	$A \vee B$	$(A \vee B) \rightarrow C$
F	F	F	T	T	F	T
F	F	T	T	T	F	T
F	T	F	T	F	T	F
F	T	T	T	T	T	T
T	F	F	F	T	T	F
T	F	T	T	T	T	T
T	T	F	F	F	T	F
T	T	T	T	T	T	T

yes

$$d) (A \rightarrow C) \wedge (B \rightarrow C) \stackrel{?}{=} (A \wedge B) \rightarrow C$$

A	B	C	$A \rightarrow C$	$B \rightarrow C$	$A \wedge B$	$(A \wedge B) \rightarrow C$
F	F	F	T	T	F	T
F	F	T	T	T	F	T
F	T	F	T	F	F	T
F	T	T	T	T	F	T
T	F	F	F	T	F	T
T	F	T	T	T	F	T
T	T	F	F	F	T	F
T	T	T	T	T	T	T

yes



g)  $A \rightarrow (B \rightarrow C) \stackrel{?}{=} (A \rightarrow B) \rightarrow C$

A	B	C	$A \rightarrow B$	$B \rightarrow C$	$A \rightarrow (B \rightarrow C)$	$(A \rightarrow B) \rightarrow C$
F	F	F	<del>T</del> T	T	T	F
F	F	T	T	T	T	T
F	T	F	T	F	T	F
F	T	T	T	T	T	T
T	F	F	F	T	T	T
T	F	T	F	T	T	T
T	T	F	T	F	F	F
T	T	T	T	T	T	T

h)  $A \rightarrow (B \rightarrow C) \stackrel{?}{=} A \wedge B \rightarrow C$

A	B	C	$B \rightarrow C$	$A \wedge B$	$A \rightarrow (B \rightarrow C)$	$A \wedge B \rightarrow C$
F	F	F	T	F	T	T
F	F	T	T	F	T	T
F	T	F	F	F	T	T
F	T	T	T	F	T	T
T	F	F	T	F	F	T
T	F	T	T	F	T	T
T	T	F	F	T	F	F
T	T	T	T	T	T	T

$$9) A \rightarrow (B \rightarrow C) \stackrel{?}{=} A \rightarrow B \wedge C$$

~~A B C    A  $\wedge$  B    B  $\rightarrow$  C    A  $\rightarrow$~~

A	B	C	B $\wedge$ C	B $\rightarrow$ C	A $\rightarrow$ (B $\rightarrow$ C)	A $\rightarrow$ B $\wedge$ C
F	F	F	F	T	T	F
F	F	T	F	T	T	T
F	T	F	F	F	T	F
F	T	T	T	T	T	T
T	F	F	F	F	F	F
T	F	T	F	T	T	T
T	T	F	F	F	F	F
T	T	T	T	T	T	T

Natural Deduction (1) A (B  $\rightarrow$  C)