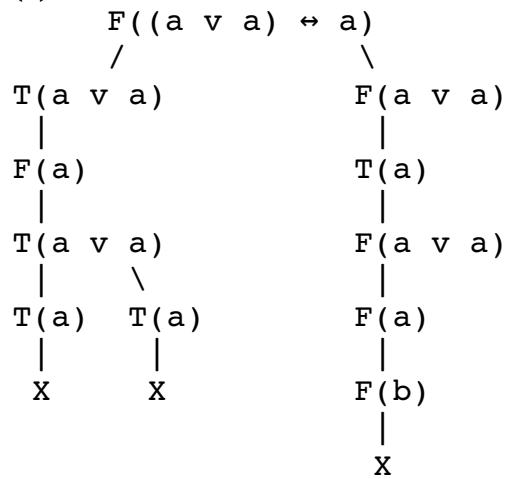
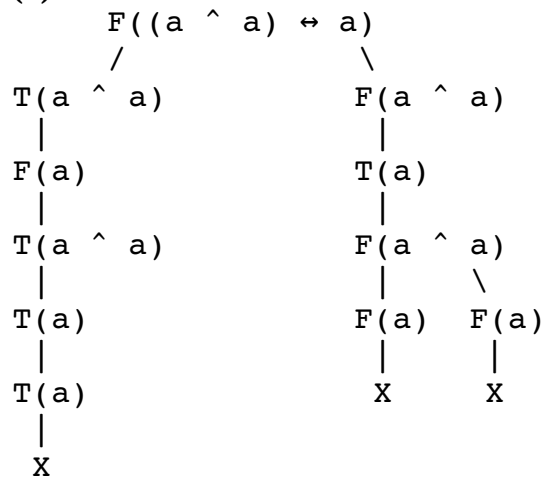


Logic for Applications

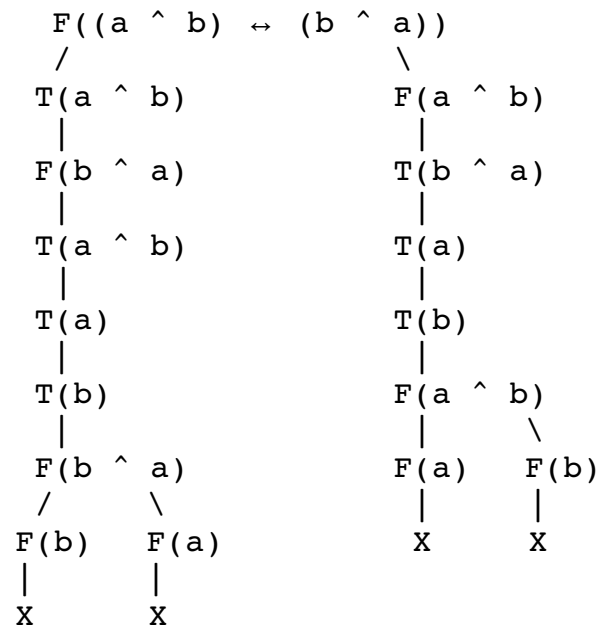
Ch 4: 1,4,6

Ch 5: 1,2

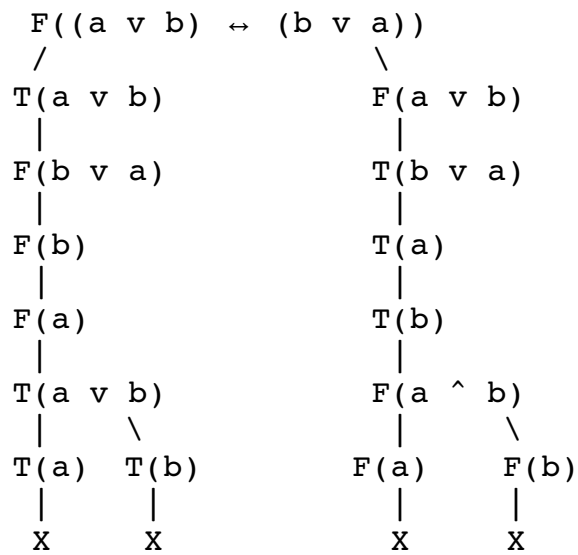
Ch 6: 6

4.1**(a)****(b)**

(c)

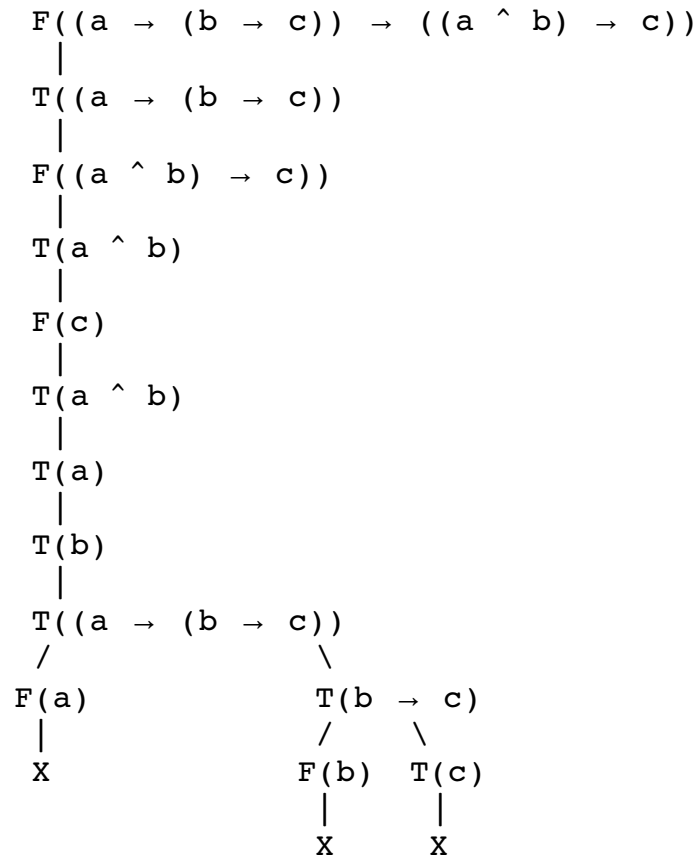


(d)

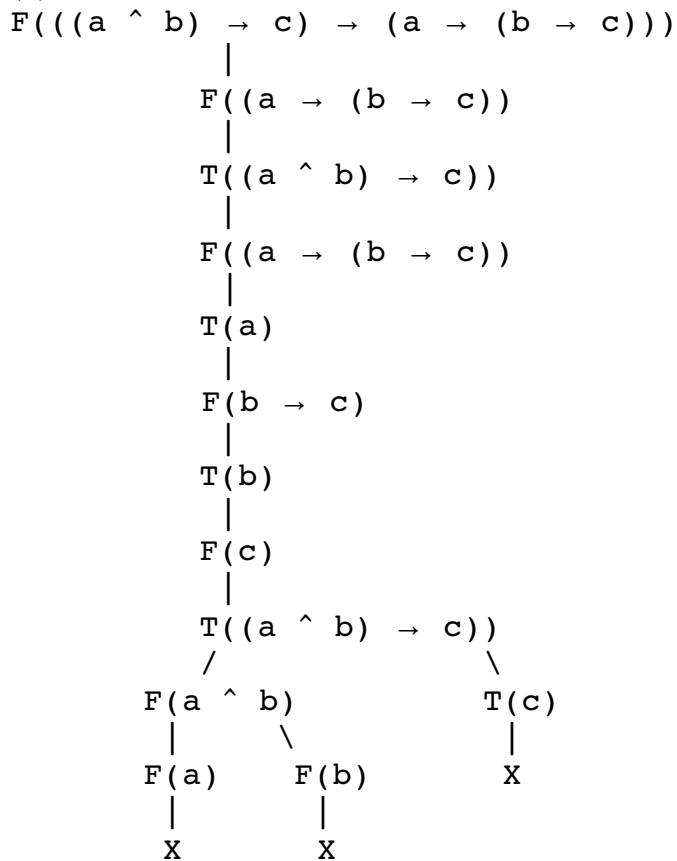


4.4

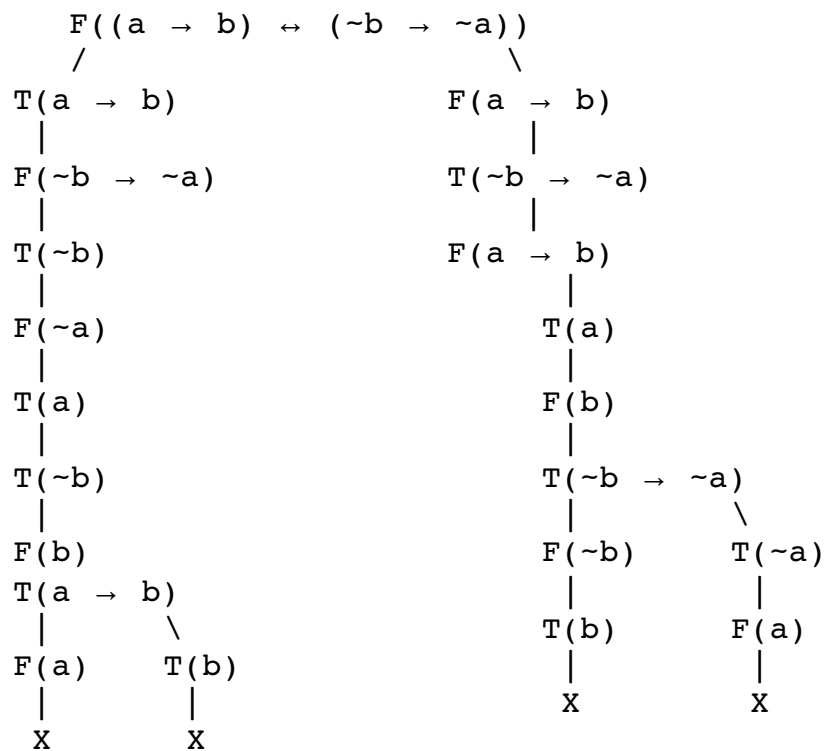
(a)



(b)



4.6



5.1

$V(a \wedge b) = T \rightarrow V(a) = T \wedge V(b) = T$ (definition of valuation/truth tables)

Which corresponds to *Figure 9, 2a*, defining the atomic tableaux

$V(a \wedge b) = F \rightarrow V(a) = F \vee V(b) = F$ (def. of valuation/truth tables)

Corresponding to *2b*

$V(\sim a) = T \rightarrow V(a) = F$ (def. of valuation/truth tables)

Corresponding to *3a*

$V(\sim a) = F \rightarrow V(a) = T$ (def. of valuation/truth tables)

Corresponding to *3b*

$V(a \vee b) = T \rightarrow V(a) = T \vee V(b) = T$ (def. of valuation/truth tables)

Corresponding to *4a*

$V(a \vee b) = F \rightarrow V(a) = F \wedge V(b) = F$ (def. of valuation/truth tables)

Corresponding to *4b*

$V(a \rightarrow b) = T \rightarrow V(a) = F \vee V(b) = T$ (def. of valuation/truth tables)

Corresponding to *5a*

$V(a \rightarrow b) = F \rightarrow V(a) = T \wedge V(b) = F$ (def. of valuation/truth tables)

Corresponding to *5b*

$V(a \rightarrow b) = F \rightarrow V(a) = T \wedge V(b) = F$ (def. of valuation/truth tables)

Corresponding to *5b*

$V(a \leftrightarrow b) = F \rightarrow (V(a) = T \wedge V(b) = F) \vee (V(a) = F \wedge V(b) = T)$ (def. of valuation/truth tables)

Corresponding to *6b*

5.2

$T(A \rightarrow B)$ occurs on P implies FA or TB occurs on P (since it is a finished tableau)

Thus, either $V(A) = F$ or $V(B) = T$ by the induc. hyp.

In either case, $V(A \rightarrow B) = T$ by the definition of valuation (truth tables)

$F(A \rightarrow B)$ occurs on P implies TA and FB occur on P

Thus, $V(A) = T$ and $V(B) = F$ by the induc. hyp.

Thus, $V(A \rightarrow B) = F$ by the definition of valuation (truth tables)

$F(\sim A)$ occurs on P implies TA occurs on P

Thus, $V(A) = T$ by the induc. hyp.

$T(\sim A)$ occurs on P implies FA occurs on P

Thus, $V(A) = F$ by the induc. hyp.

$T(A \vee B)$ occurs on P implies TA or TB occurs on P

Thus, either $V(A) = T$ or $V(B) = T$ by the induc. hyp.

Thus, $V(A \vee B) = T$ by the definition of valuation (truth tables)

$F(A \vee B)$ occurs on P implies FA and FB occur on P

Thus, $V(A) = F$ and $V(B) = F$ by the induc. hyp.

Thus, $V(A \vee B) = F$ by the definition of valuation (truth tables)

$T(A \leftrightarrow B)$ occurs on P implies TA and TB occur on P or FA and FB occur on P

Thus, $V(A) = T$ and $V(B) = T$ or $V(A) = F$ and $V(B) = F$ by the induc. hyp.

Thus, $V(A \leftrightarrow B) = T$ by the definition of valuation (truth tables)

$F(A \leftrightarrow B)$ occurs on P implies TA and FB occur on P or FA and TB occur on P

Thus, $V(A) = T$ and $V(B) = F$ or $V(A) = F$ and $V(B) = T$ by the induc. hyp.

Thus, $V(A \leftrightarrow B) = F$ by the definition of valuation (truth tables)

⊢

6.6

(a) \rightarrow (c) [6.8]

(c) \rightarrow (a) [6.6]

(a) \leftrightarrow (c)

(b) \rightarrow (d) [5.3]

(d) \rightarrow (b) [5.1]

(b) \leftrightarrow (d)

proof of (a) \leftrightarrow (b)

By definition 6.2, a tableaux proof of " $S \models s$ " is:

$$\begin{array}{c} Fs \\ | \\ T(\wedge S) \end{array}$$

While a tableau proof of $\models \wedge S \rightarrow s$ is:

$$\begin{array}{c} F(\wedge S \rightarrow s) \\ | \\ Fs \\ | \\ T(\wedge S) \end{array}$$

Which are equivalent. The rest are equivalent by transitivity.