

**Sheffer Stroke** Consider the following truth table definition for a logical connective called a *Sheffer Stroke*:

X	Y	$X Y$
t	t	f
t	f	f
f	t	f
f	f	t

1. Using a truth table, translate  $X|Y$  into our regular SL by finding a logical equivalence.
2. Based on the logical equivalence you have proven, using logical laws, deduce that  $(X|Y)|(X|Y) \equiv X \vee Y$
3. Provide the tree rules for  $X|Y$  and  $X|X$ .
4. Using the tree rules you just came out with, prove that  $X|X \equiv \neg X$

**Proofs with SL Trees** Verify if the following relations hold using trees.

1.  $I \rightarrow (J \rightarrow K) \models (I \rightarrow J) \rightarrow K$
2.  $(H \leftrightarrow \neg Q) \leftrightarrow (H \leftrightarrow \neg M) \models H \rightarrow [Q \vee \neg(\neg Q \wedge M)]$
3.  $\models \neg(A \wedge B) \leftrightarrow (\neg A \vee \neg B)$
4.  $\models [H \rightarrow (O \rightarrow N)] \rightarrow [(H \wedge O) \rightarrow N]$
5.  $A \rightarrow \neg A \equiv \neg A$
6.  $(D \wedge N) \rightarrow J \equiv D \rightarrow (N \rightarrow J)$