III) (I won't do a Partial Because I'll need to do a lot of assumptions)

P	Q	R	$(P \leftrightarrow (Q \leftrightarrow R))$		$\leftrightarrow$	$((P \leftrightarrow Q)$	$\leftrightarrow R)$
T	T	T	T	T	T	T	T
T	T	F	F	F	T	T	F
T	F	T	F	F	T	F	F
T	F	F	T	T	T	F	T
F	T	T	F	T	T	F	F
F	T	F	T	F	T	F	T
F	F	T	T	F	T	T	T
F	F	F	F	T	T	T	F

→ tautology

IV

	P Q	$\neg(P \rightarrow Q)$				$\leftrightarrow$	$(P \wedge \neg Q)$			
1.1	T F	T_1	T_5	F_3	F_4	T	T_6	T_2	T_7	F_8
1.2										
2.1		T_1	T_5	F_3	F_4	F	T_6	F_2	F_7	?
2.2		F_1	?	T_3	F_7	F	T_4	T_2	T_5	F_6

→ tautology

2.7

III) $|\phi \vee \psi|_A = F$ iff $|\phi|_A = F$ and $|\psi|_A = F$

IV) $|\phi \to \psi|_A = F$ iff $|\phi|_A = T$ and $|\psi|_A = F$

V) $|\phi \leftrightarrow \psi|_A = F$ iff $|\phi|_A \neq |\psi|_A$

2.8 According to definition 2.9 $\Gamma \vDash \phi$ iff there is no $\mathcal{L}_1$-structure in which all sentences ~~are true~~ in Γ are true and ϕ is false.

According to definition 2.11 a set of sentences is consistent iff there is an $\mathcal{L}_1$-structure under which all sentences in the structure are true.

~~If~~ So, if a set is inconsistent there is no $\mathcal{L}_1$-structure under which all sentences in that set are are true.

If the set containing all sentences in Γ and $\neg\phi$ is inconsistent then there is no counterexample as in definition 2.10. therefore, the argument must be valid.