

1.4.xa. Exercise answers

1.
 - a. ϕ and ψ together entail χ
 - b. $\psi \Rightarrow \phi$
 - c. ϕ is equivalent to itself
 - d. ψ is absurd
or: ψ taken by itself forms an inconsistent set
 - e. $\Gamma, \phi \Rightarrow$
or: $\Gamma, \phi \Rightarrow \perp$
(Strictly speaking, $\Gamma, \phi \Rightarrow \perp$ expresses entailment rather than inconsistency, but it is true if and only if ϕ is inconsistent with Γ .)
 - f. $\Gamma, \psi \Rightarrow \phi$
2.
 - a. We have supposed that $\Gamma \Rightarrow \phi$. That is, we have supposed that ϕ is **T** in any possible world in which all members of Γ are **T**. But w is a world in which all members of Γ are **T**, so ϕ , too, must be **T** in w .
 - b. We now know that ϕ and all members of Γ are **T** in w . But we supposed that $\Gamma, \phi \Rightarrow \psi$ and we now know that all the premises of this entailment are **T** in w , so ψ also must be **T** also.
 - c. For w to be a counterexample to $\Gamma \Rightarrow \psi$, it must make give ψ the value **F** and give all the members of Γ the value **T**.
 - d. A counterexample to $\Gamma \Rightarrow \phi$ must give ϕ the value **F** and give all the members of Γ the value **T**. A counterexample to $\Gamma, \phi \Rightarrow \psi$ must give ψ the value **F** while giving ϕ and all the members of Γ the value **T**.
 - e. We know that w gives ψ the value **F** and gives all the members of Γ the value **T**. But it also must make ϕ either **T** or **F**. If it does the former, it is a counterexample to $\Gamma, \phi \Rightarrow \psi$; and if it does the latter, it is a counterexample to $\Gamma \Rightarrow \phi$.