Show $\neg(A \wedge B)$ is equivalent to $(\neg A) \vee (\neg B)$.

A	B	¬(A ∧ B)	(¬A)	∨	(¬B)
T	T	F	F	F	F
T	F	T	F	T	T
F	T	T	T	T	F
F	F	T	T	T	T

SAME → equivalent!

Ex: Show $\neg(G \rightarrow M)$ entails G.

G	M	¬(G → M)	G	G → ¬M
T	T	F	T	F F
T	F	T	T	T T
F	T	F	F	T F
F	F	F	F	T T

not equivalent

p.90

P	Q	P	P→Q	Q
T	T	T	T	T
T	F	T	F	F
F	T	F	T	T
F	F	F	T	F

premises — conclusion

No valuation where both P and P→Q are true and simultaneously Q false.

Ex: $\models P \vee \neg P$

P	P ∨ ¬P
T	T F
F	T T

$\models$ ~ semantics thing living in English (metalanguage)

$\rightarrow$ - connective in TFL~ syntax thing

p.92 B2 | jointly satisf. or j. unsatisf. ?

$A \vee B,\ A \to C,\ B \to C$

A	B	C	A∨B	A→C	B→C
T	T	T	T	T	T
T	T	F	T	F	F
T	F	T	T	T	T
T	F	F	T	F	T
F	T	T	T	T	T
F	T	F	T	T	F
F	F	T	F	T	T
F	F	F	F	T	T

this row is a valuation in which all the sentences are true!

Conclude these are jointly satisfiable

p. 92 B3] j. satisf. or j. unsatisf?

$B \wedge (C \vee A),\ A \rightarrow B,\ \neg(B \vee C)$

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

there is no row where all ~~these~~ three sentences are simultaneously true!

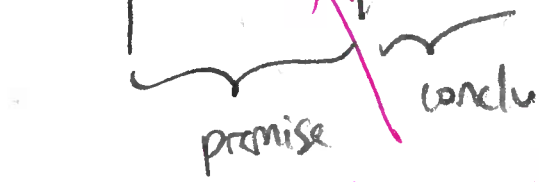
jointly unsatisfiable

p 93 C1 Is $A \to A \therefore A$ valid?

Really this is asking whether or not

$$A \to A \models A$$

A	A → A	A
T	T	T
F	T	F



in this valuation,

A → A true but A is false

(premise) (conclusion)

Therefore,

$$A \to A \not\models A$$

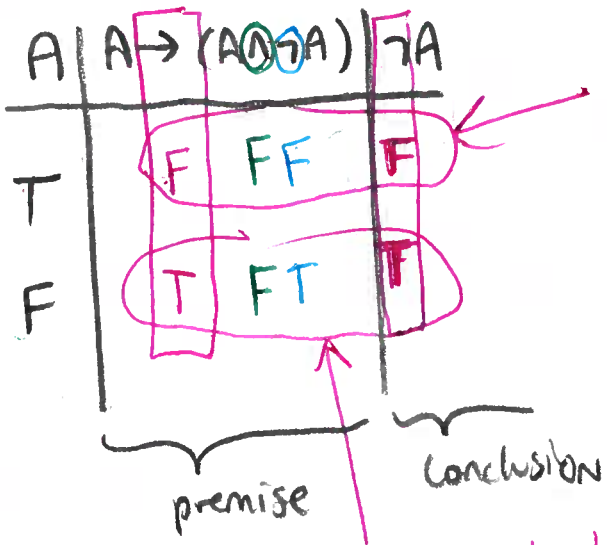
So the argument

$A \to A \therefore A$ is not valid.

P.92 C2 | Is $A \to (A \wedge \neg A) \therefore \neg A$ valid?

Check if

$$A \to (A \wedge \neg A) \models \neg A$$



in this valuation premise is false, so it cannot be a counterexample

in this valuation, true premise true & concl. ~~false~~

~~$A \to (A \wedge \neg A) \not\models \neg A$~~

NOT a counterexample

Therefore, $A \to (A \wedge \neg A) \models \neg A$

Thus, $A \to (A \wedge \neg A) \therefore \neg A$ is valid