

① Given a formula F : is F satisfiable?

- Convert F into negation normal form (NNF)
if F is not yet in NNF
- Run the tableau algorithm on F
- If ~~you~~ find a complete ~~open~~ open tableau branch,
then output: F is satisfiable.
- Otherwise (we cannot find a complete ^{open} tableau branch)
no all branches are closed.
then output: F is not satisfiable.
(F is unsatisfiable).

② Given a formula F : is F unsatisfiable?
no the same thing as above.

③ Given a formula F : is F valid?
no this the same as asking $\neg F$: is $\neg F$ unsatisfiable?

- Convert $\neg F$ into negation normal form
- run tableau alg. on $\neg F$ (after conversion)
- If all branches are closed, then $\neg F$ is unsatisfiable
(i.e., F is valid)
- Otherwise, you find a complete open tableau branch for $\neg F$
 $\Rightarrow \neg F$ is satisfiable $\Rightarrow F$ is not valid.

④ Given two formulas F, G : $F \equiv G$?

\Rightarrow is $F \rightarrow G$ valid?

- answer the question as in ③ with input $F \rightarrow G$

⑤ Given a set of formulas $M = \{F_1, \dots, F_n\}$ and a formula G
 $\bigwedge \{F_1, \dots, F_n\} \models G$?

\Rightarrow is $(F_1 \wedge \dots \wedge F_n) \rightarrow G$ valid?
use ③

⑥ Given two formulas F, G : $F \equiv G$?

\Rightarrow is $F \leftrightarrow G$ valid?

use ③ $(F \rightarrow G) \wedge (G \rightarrow F)$