

Satisfiability

For each of the following expressions, determine if it is satisfiable or not satisfiable. If it is satisfiable, determine if it is a tautology.

1. $(A \wedge B) \rightarrow A$

(Answer: tautology)

2. $(A \wedge B) \rightarrow \neg A$

(Answer: satisfiable ($A = B = \mathbf{F}$) but not a tautology ($A = B = \mathbf{T}$))

3. $(A \wedge B) \leftrightarrow A$

(Answer: satisfiable ($A = B = \mathbf{T}$) but not a tautology ($A = \mathbf{T}$ and $B = \mathbf{F}$))

4. $(A \rightarrow B) \wedge A \wedge \neg B$

(Answer: not satisfiable, so never true)

5. $A \rightarrow \neg A$

(Answer: satisfiable ($A = \mathbf{F}$) but not a tautology ($A = \mathbf{T}$))