2.3.1 Propositional Logic.

Prove the following logical equivalences making use of semantic tableaux:

a) $A \wedge (B \vee C) \equiv (A \wedge B) \vee (A \wedge C)$

b) $A \vee B \equiv \neg(\neg A \wedge \neg B)$

c) $A \wedge B \equiv \neg(\neg A \vee \neg B)$

d) $A \rightarrow B \equiv \neg A \vee B$

e) $A \rightarrow B \equiv \neg(A \wedge \neg B)$

2.3.2 Propositional Logic.

Prove or disprove making use of semantic tableaux:

a) $\models (A \rightarrow B) \vee (B \rightarrow A)$

b) $\models ((A \rightarrow B) \rightarrow B) \rightarrow B$