Guided Tutorials n°3

Exercise 1

Verify, through resolution, whether the formula D can be derived from the conditions mentioned below:

$$\{((B \wedge F) \Rightarrow (A \vee E)) \wedge (\neg C \Rightarrow (E \vee F)) \wedge ((B \wedge A) \Rightarrow C) \wedge (E \Rightarrow \neg B) \wedge (C \Rightarrow D) \wedge B\} \vdash D$$

Exercise 2

Formalize the given sentences using propositional logic and then determine whether the set $\{A_1, A_2, A_3, A_4, A_5, \neg C\}$ is satisfiable or not?

A_1) If we don't support the prices of essential food items, we risk losing the trust and support of the citizens.

A_2) Unless we adopt renewable energies, there will be the depletion of petroleum resources.

A_3) We need the citizens' voices to be reelected.

A_4) If oil resources are depleted, the country's economy will be affected.

A_5) If the country's economy is affected, then the prices of essential food items are no longer financially supported.

C) If we adopt renewable energies, we will be reelected.

Exercise 3

Can we check the following relationships by resolution?

1. $\{\neg A \Rightarrow B, C \Rightarrow \neg A\} \vdash (\neg A \Rightarrow (\neg C \Rightarrow B))$

2. $\{P \Rightarrow (R \wedge T), (T \vee S) \Rightarrow \neg Q\} \vdash \neg(P \wedge Q)$

3. $\{(P \vee Q \vee S), (S \Rightarrow P), (P \Rightarrow Q)\} \vdash Q$