CSE541 Exercise 2

SOLVE ALL PROBLEMS as PRACTICE and only AFTER look at the SOLUTIONS!!

Please write solutions very carefully. The grade you receive on TESTS depends not only on the fact that you SOLVE the problem, but also (30%) on elegance of your solution. Use examples from the book as a learning material of how to write solutions properly.

QUESTION 1 Give a definition and an example of a default reasoning.

QUESTION 2 Write the following natural language statement:

From the fact that it is not necessary that an elephant is not a bird we deduce that:

it is not possible that an elephant is a bird or, if it is possible that an elephant is a bird, then it is not necessary that a bird flies.

as a formula

(i) $A_1 \in \mathcal{F}_1$ of a language $\mathcal{L}_{\{\neg, \land, \lor, \Rightarrow\}},$

(ii) $A_2 \in \mathcal{F}_2$ of a language $\mathcal{L}_{\{\neg, \land, \lor, \Rightarrow\}}$.

2. Main connective of the formula $A_1$ is: , main connective of the formula $A_2$ is:

3. Degree of the formula $A_1$ is: , degree of the formula $A_2$ is:

4. Write all proper, non-atomic sub-formulas of $A_1$.

5. Write all non-atomic sub-formulas of $A_2$.


7. There are more then 3 possible restricted counter-models of $A_2$. Justify.

8. There are more then 2 possible restricted models of $A_2$. Justify your answer.

9. List 3 models and 2 counter-models for $A_2$ by extending the restricted model and the counter-model you have found in 6. to the set $VAR$ of all variables.

10. There are possible models for $A_2$.

    There are possible counter-models for $A_2$.

QUESTION 3 Show that

$$\models ((\neg a \cup b) \Rightarrow (((c \cap d) \Rightarrow \neg d) \Rightarrow (\neg a \cup b)))$$