

CSE371 SAMPLE Q1

Please write solutions very carefully. The grade you receive depends not only on the fact that you SOLVE the problem, but also (20%) on elegance of your solution. Use examples from the book as a learning material of how to write solutions properly

QUESTION 1 (5pts) Describe a difference between logical and semantical paradoxes.

QUESTION 2 (20pts)

1. Write the following natural language statement:

From the fact that it is possible that Chris is not a boy we deduce that it is not possible that Chris is not a boy or, if it is possible that Chris is not a boy, then it is not necessary that Anne is pretty.

as a formula

(2pts) $A_1 \in \mathcal{F}_1$ of a language $\mathcal{L}_{\{\neg, \mathbf{C}, \mathbf{I}, \mathbf{O}, \mathbf{U}, \Rightarrow\}}$,

(2pts) $A_2 \in \mathcal{F}_2$ of a language $\mathcal{L}_{\{\neg, \mathbf{O}, \mathbf{U}, \Rightarrow\}}$.

2. (1pts) Degree of the formula A_1 is: _____, degree of the formula A_2 is:

3. (2pts) All proper, non-atomic sub-formulas of A_1 are:

4. (2pts) All proper, non-atomic sub-formulas of A_2 are:

5. (3pts) Find a model (restricted) and a restricted counter-model for A_2 (classical semantics). Use short-hand notation. Show work.

A Restricted Model:

Evaluation:

A Restricted Counter-Model:

Evaluation:

6. (2pt) There are possible counter-models restricted to A_2 .

7. (2pts) There possible models restricted to A_2 . (Don't need to list them, just justify your answer).

8. (2pts) List 3 models and 3 counter-models for A_2 by extending the restricted model and the counter-model you have found in 4. to the set VAR of all variables.

9. (2pts) There are possible models for A_2 .
There are possible counter-models for A_2 .

QUESTION 3 (EXTRA 5pts) Show that

$$\models (\neg((a \wedge \neg b) \Rightarrow ((c \Rightarrow (\neg f \cup d)) \cup e)) \Rightarrow ((a \wedge \neg b) \wedge (\neg(c \Rightarrow (\neg f \cup d)) \wedge \neg e))).$$