4CCS1ELA - Elementary Logic with Applications
Programming with Logic I:
Propositional Definite Clause Programming

Tutorial List 6

Question 1

i) Which of the following formulae are in CNF?

1. P
2. ¬Q ∨ (S ∧ P)
3. P ∨ Q
4. (¬Q ∨ S) ∧ (¬Q ∨ P)
5. P ∧ Q

ii) In the following CNF formula which clauses are Horn and which are definite?

(¬Q ∨¬S) ∧ (¬Q ∨ P) ∧ (¬Q ∨ P ∨ R)

iii) List all the definite clauses (in their rule form) in the following CNF formulas:

Cnf1 P

Cnf2 (¬P ∨ Q) ∧ (¬P ∨ R)

Cnf3 ¬Q ∨ S

Cnf4 ¬S ∨¬R ∨ T

Question 2:

Transform $\boldsymbol{P}$ and $\boldsymbol{P \vee Q \rightarrow S}$ to CNF and then to a definite clause program. Then draw two

proof trees for the query ***?S***; one that fails and one that succeeds.

Question 3:

Transform the following formulas into CNF, showing the transformation rules that you use. Then for each clause in each CNF formula, say whether it is a definite clause and show its definite rule representation:

1. $\neg P \rightarrow (\neg Q \wedge R)$
2. $\neg(S \vee R) \wedge T$

Question 4:

Transform the following wff to CNF. Then represent the transformed formula as definite rules:

$\neg(R \rightarrow \neg T)$