书面作业1.3

第1部分 基础

无

第2部分 理论

T1. 请用直接法和间接法证明 (P∨Q)∧(P→R)∧(Q→S)∧¬S⇒R.

T2. 证明二难推理 (α→γ)∧(β→γ)∧(α ∨ β)⇒γ 与 假言三段论(α→β)∧(β→γ)⇒α→γ

T3. 用CP规则证明：

A→(B→C)，(C∧D)→E，¬F→(D∧¬E)⇒A→(B→F).

T4. 用反证法证明:

(A→B)∧(C→D)，(B→E)∧(D→F)，¬(E∧F)，A→C⇒¬A.

T5. Prove that the following rule, called the Destructive Dilemma rule(破坏性二难), can be derived from the original and derived proof rules.

Premises: ¬ C ∨ ¬ D， A → C， B → D

Conclusion: ¬ A ∨ ¬ B.

T6. Two students came up with the following different wffs to formalize the statement(命题) "If A then B else C."

(A ∧ B) ∨ (¬ A ∧ C).

(A → B) ∧ (¬ A → C).

Prove that the two wffs are equivalent by finding formal proofs for the following two statements.

a. ((A ∧ B) ∨ (¬ A ∧ C)) → ((A → B) ∧ (¬ A → C)).

b. ((A → B) ∧ (¬ A → C)) → ((A ∧ B) ∨ (¬ A ∧ C)).

第3部分 应用（T2选做）

T1. 在某一次足球比赛中，四支球队进行了比赛，已知情况如下，问结论是否有效? 请给出形式化证明.
前提：若A队得第一，则B队或C队获亚军；若C队获亚军，则A队不能获冠军；若D队获亚军，则B队不能获亚军；A 队获第一.
结论： D队不是亚军.

T2. Consider the following argument that aims to prove that Superman does not exist.
If Superman were able and willing to prevent evil, he would do so. If Superman were unable to

prevent evil he would be impotent(虚弱无能); if he were unwilling to prevent evil he would be malevolent（邪恶）;Superman does not prevent evil; If superman exists he is neither malevolent nor impotent. Therefore Superman does not exist.