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## PHI 210 Weekly Assignment #5

**1.If you write down the answer of the assignment on a blank sheet of paper, always remember to write down your name and C number.**

**2.If you write down your answer on a sheet of paper, remember to specify the number of the question.**

**Name:**

**C Number:**

**Due Date: 2020/10/3 11:59 PM**

### **I.Truth-trees method (2pts):**

(a) Construct truth-tree for following sequents and decide whether the following sequent is valid or not. If the sequent is invalid, please write down one IPLI.

1.  $P \rightarrow Q, Q \rightarrow P : P$

2.  $S \leftrightarrow T, S : T$

(b) Construct truth-trees for following sequents and decide whether the following statement is true or not.

1. Is  $\{L, M \& B\} \models Q$ ? (Hint: you can read the question as asking: is  $Q$  the semantic consequence of set  $\{L, M \& B\}$ ?)

2. Is  $\{P \rightarrow Q, \sim Q\} \models \sim P$ ? (Hint: you can read the question as asking: is  $\sim P$  the semantic consequence of set  $\{P \rightarrow Q, \sim Q\}$ ?)

**II. Natural deduction: construct a proof from premises to the conclusion of the sequent below by rule of inference you've learned in the class. (3pts)**

1.  $(P \& Q) \& (R \& S) : R$

2.  $P \rightarrow (P \& Q), P : Q$

3.  $(P \rightarrow R) \& P : R$

4.  $Q, P \leftrightarrow Q : P$

5.  $R \rightarrow S, T \& (T \rightarrow (S \rightarrow R)) : R \leftrightarrow S$

6.  $Q, R : P \rightarrow (Q \& R)$

III. Bonus-Natural deduction: construct a proof from premises to the conclusion of the sequent below by rule of inference you've learned in the class (1pts)

1.  $P \rightarrow Q : (P \& R) \rightarrow Q$

2.  $(P \& Q) \rightarrow R, P : Q \rightarrow R$



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