

## Unit B5: Supplemental Notes, 10/7/03

Note: This applies only to Section 1 (i.e., the 9:30 a.m. class), in which I had trouble explaining one problem of a group exercise.

### In-Class Group Exercise

Determine whether the following wff is tautology (always true), contradiction (always false), or neither:

$$B2: (\neg p \vee q) \vee (p \vee \neg q)$$

Answer:

(a) A conservative, but tedious way to analyze this is to check all the four truth assignments for the propositional variables. This should show that the wff is a tautology.

(b) A simpler way to show that the wff is a tautology is as follows. The formula can be rewritten as  $(p \rightarrow q) \vee (q \rightarrow p)$ , by applying the equivalence  $\neg X \vee Y \Leftrightarrow X \rightarrow Y$  and  $X \vee Y \Leftrightarrow Y \vee X$ . Then, in order for the entire wff to be false, at least one of  $p \rightarrow q$  and  $q \rightarrow p$  must be false. The only way to make  $p \rightarrow q$  false is to set  $p = \mathbf{T}$  and  $q = \mathbf{F}$ . However, this will make  $q \rightarrow p$  true. Thus, the wff cannot be false.

<End>