Logic I
Fall 2009
Problem Set 5

In class I talked about SL being truth-functionally complete (TF-complete). For the problems below, use TLB's definition of TF-completeness, according to which it is sets of connectives that are (or aren't) TF-complete:

Definition: A set of connectives is TF-complete iff a language with only connectives in that set can express every truth-function.

1. Assume the fact in 6.1E (1d). Use this to complete problem 6.2E (1).

   This result shows that the algorithm on pages 252–255 generates, for any truth-function, a sentence of SL that expresses that truth-function. So it completes the proof that the set of connectives of SL is TF-complete. In fact, it proves that the smaller set {'$\neg$','&','$\vee$'} is TF-complete, because those are the only connectives in SL we used in the algorithm.

2. Use the fact that {'$\neg$','&','$\vee$'} is TF-complete to do problem 6.2E (5).

3. Complete problem 6.3E (4b). To do this, explain how to modify the proof by mathematical induction on pages 260–264 of TLB, and explain why your modification yields the desired proof.

24.241 Logic I
Fall 2009