CS 510
Semantics
Assignment 1
Due Thursday, January 19, 2005

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Problems

1. Tennent, exercise 2.4. Read part (a) as "If there exists any (i.e., some) $i \in I$ such that $A_i = \emptyset$, then $\prod_{i \in I} A_i = \emptyset$." (As given in the text, the problem is ambiguous: "for any" could be understood as meaning "for all.")

2. Tennent, exercise 2.9

3. Tennent, exercise 3.3 c

4. Tennent, exercise 3.5. Justify your answer using semantic equations.

5. Tennent, exercise 3.7. Hint for part (a): Use mathematical induction. As the basis, show graph $c_0 \subseteq$ graph c_1. For the induction step, show that the hypothesis

   $$\text{graph } c_i \subseteq \text{graph } c_{i+1}$$

   (equivalently, whenever $c_i(s')$ is defined then $c_{i+1}(s') = c_i(s')$) entails the conclusion

   $$\text{graph } c_{i+1} \subseteq \text{graph } c_{i+2}$$

   (equivalently, whenever $c_{i+1}(s)$ is defined then $c_{i+2}(s) = c_{i+1}(s)$).

   Restatement of part (b): Prove that if (s, s') and (s, s'') are both in $\bigcup_{i \in N}$ graph c_i, then $s' = s''$.

Suggested Tennent, exercise 2.1. You only need to consider the rules for implication and absurdity. In addition, please show the classical absurdity rule below is also valid:

$$\frac{\begin{array}{c}[A \Rightarrow \mathbf{absurd}] \\ \mathbf{absurd}\end{array}}{A}$$