Mathematics-Computer Science 4215H – Mathematical Logic
TRENT UNIVERSITY, Winter 2021

Assignment #2
Due on Friday, 29 January.

Do all of the following problems, which are straight out of Chapter 1 of the textbook[0] (which explains the numbering), reproduced here for your convenience.

2.1. *[Problem 2.1]* Suppose v is a truth assignment such that $v(A_0) = v(A_2) = T$ and $v(A_1) = v(A_3) = F$. Find $v(\alpha)$ if α is:
(1) $\neg A_2 \to \neg A_3$
(3) $\neg(\neg A_0 \to A_1)$
(5) $A_0 \wedge A_1$ *[1.5 = 3×0.5 each]*

2.2. *[Proposition 2.2]* Suppose δ is any formula and u and v are truth assignments such that $u(A_n) = v(A_n)$ for all atomic formulas A_n which occur in δ. Show that $u(\delta) = v(\delta)$. *[4.5]*

2.3. *[Corollary 2.3]* Suppose u and v are truth assignments such that $u(A_n) = v(A_n)$ for every atomic formula A_n. Show that $u = v$, *i.e.* $u(\varphi) = v(\varphi)$ for every formula φ. *[1]*

2.7. *[Proposition 2.7]* Show that if Γ and Σ are sets of formulas such that $\Gamma \subseteq \Sigma$, then $\Sigma \models \Gamma$. *[1]*

2.8. *[Problem 2.8]* How can one check whether or not $\Sigma \models \varphi$ for a formula φ and a finite set of formulas Σ? *[3]*

2.10. *[Proposition 2.10]* Show that a set of formulas Σ is satisfiable if and only if there is no contradiction χ such that $\Sigma \models \chi$. *[4]*

[Total = 15]

[0] *A Problem Course in Mathematical Logic*, Version 1.6.