

CS 245 — Assignment #1

Spring 2006

Due Date: Tuesday, May 16 at 5pm.

Use `makeCover` to produce a cover page for your assignment and hand in your assignment in the CS 245 assignment box. Assignments are to be done individually.

1. (12 points) Translate the following sentences into propositional logic. Show the English phrase that each propositional letter represents.
 - (a) Whether or not it is raining, I am going swimming.
 - (b) If it rains while I am swimming, I will go hiking.
 - (c) If there is a thunderstorm I'll go hiking, but I won't go swimming.
 - (d) I will go hiking even though it is raining.
 - (e) I will go hiking only if I do not go swimming.
 - (f) I will go swimming unless there is a thunderstorm.
2. (6 points) For each of the following formulas, answer each of the following questions. Is the formula consistent? Is the formula a contradiction? Is the formula a tautology? Be sure to explain your answers.
 - (a) $(q \vee r) \Rightarrow p$
 - (b) $\neg(p \Rightarrow q) \Leftrightarrow (p \wedge \neg q)$
 - (c) $(p \Rightarrow q) \Leftrightarrow \neg(\neg p \vee q)$
3. (6 points) Do the premises logically imply the conclusion? Answer this question using a truth table and explain your answer.
$$\neg A \Rightarrow \neg C, \neg(A \wedge B) \models C \Rightarrow B$$
4. (6 points) Do the premises logically imply the conclusion? Answer this question using a truth table and explain your answer.
$$\neg p \Rightarrow \neg q, p \Rightarrow r \models \neg(q \wedge \neg r)$$