

CSE 311: Foundations of Computing I
Assignment #1
March 31, 2010
due: Wednesday, April 7, 1:30 p.m.

1. Section 1.1, exercise 20, parts a, b, e, f, g, h.
2. State in English the converse and contrapositive of each of the following implications:
 - (a) If a is pushed onto the stack before b , then b is popped before a .
 - (b) If the input is correct and the program terminates, then the output is correct. (Be sure to use De Morgan's Law to simplify the contrapositive.)
3. Section 1.1, exercise 48.
4. Section 1.1, exercise 62.
5. Section 1.2, exercise 10d.
6. Section 1.2, exercise 14.
7. Section 1.2, exercise 16. Use a truth table rather than following the confusing instructions preceding this exercise.
8. Section 1.2, exercise 42. (Hint: Do exercise 41 as a warmup, and check your solution at the back of the textbook.) For full credit on exercise 42, it is not sufficient to give an example of the construction. You should describe the construction in its generality. To get you started, suppose the propositional variables are p_1, p_2, \dots, p_n and the compound proposition is f . Consider a line of the truth table of the form

$$\left| \begin{array}{cccc|c} p_1 & p_2 & \dots & p_n & f \\ v_1 & v_2 & \dots & v_n & T \end{array} \right|$$

where v_1, v_2, \dots, v_n are each either T or F. Corresponding to this line of the truth table, specify what conjunction of variables or their negations you will add to your formula. What about for each line of the truth table of the form

$$\left| \begin{array}{cccc|c} p_1 & p_2 & \dots & p_n & f \\ v_1 & v_2 & \dots & v_n & F \end{array} \right| ?$$

(One of the reasons this exercise is important is that it demonstrates that any propositional formula can be expressed using only the connectives \neg, \wedge, \vee , and in fact in this very simple disjunctive normal form.)