CSE 311: Foundations of Computing I
Assignment #1
March 28, 2012
due: Wednesday, April 4, 1:30 p.m.

Textbook numbering labeled "6th ed" refers to the textbook's Sixth Edition. Numbering that is unlabeled refers to the Seventh Edition.

1. Section 1.1, exercise 24 [6th ed.: 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 1.2, exercise 8. [6th edition: Section 1.1, exercise 48.]
4. Section 1.2, execise 34. [6th edition: Section 1.1, exercise 62.]
5. Section 1.3 [6th edition: Section 1.2], exercise 10d.
6. Section 1.3 [6th edition: Section 1.2], exercise 14.
7. Section 1.3 [6th edition: Section 1.2], exercise 16. Use a truth table rather than following the confusing instructions preceding this exercise.
8. Section 1.3 [6th edition: 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 $p_1, p_2, \ldots, p_n$ and the compound proposition is f. Consider a line of the truth table of the form

$$\begin{array}{|cccc|c|} p_1 & p_2 & \ldots & p_n & f \\ \hline v_1 & v_2 & \ldots & v_n & T \end{array}$$

   where $v_1, v_2, \ldots, v_n$ 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

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

   (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.)