1. (3.1, Prob 1) Give truth tables for the following expressions:
   (a) \((s \lor t) \land (\neg s \lor t) \land (s \lor \neg t)\)
   (b) \((s \implies t) \land (t \implies u)\)
   (c) \((s \lor t \lor u) \land (s \lor \neg t \lor u)\)

2. (3.1, Prob 8) Use a truth table to show that \((s \and t) \land (u \or v)\) is equivalent to \((s \or u) \land (s \or v) \land (t \and u) \lor (t \and v)\).

3. (3.1, Prob 9) Use DeMorgan’s Law, the distributive law and the previous problem to show that \(\neg((s \lor t) \land (s \lor \neg t))\) is equivalent to \(\neg s\).

4. (3.1, Prob 13) Suppose that for each line of a 2-variable truth table you are told the value in the final column, true or false. (For example, you might be told that the final column contains T, F, T and F in that order.) Explain how to create a logical statement using the symbols \(s, t, \land, \lor,\) and \(\neg\) that also realizes the same truth table. Can you extend this procedure to an arbitrary number of variables?

5. (3.2, Prob 1) For what positive integers \(x\) is the statement \((x - 2)^2 + 1 \leq 2\) true? For what integers is it true? For what real numbers is it true? If we expand the universe for which we are considering a statement about a variable, does this always increase the size of the statement’s truth set?

6. (3.2, Prob 6) Using \(s(x, y, z)\) to be the statement \(x = yz\) and \(t(x, y)\) to be the statement \(x < y\), write a formal statement for the definition of the greatest common divisor of two numbers.

7. (3.2, Prob 10) Rewrite the following statement without any negations: It is not the case that there exists an integer \(n\) such that \(n > 0\) and for all integers \(m > n\), for every polynomial equation \(p(x) = 0\) of degree \(m\) there are no real numbers for solutions.