Problem Set 2 – Due Tuesday, April 14, 2009; 3:15PM

1. Translate the following sentence into a formula of sentential logic: “You are eligible to get a driver’s license in CA if you are over 18 or are over 15, have passed driver’s education, and have at least 50 hours of supervised driving.”

2. Three students, A, B, and C, are suspected of cheating on an examination. When they are questioned by Judicial Affairs, they assert:

   A: “B copied and C is innocent”
   B: “If A is guilty then so is C”
   C: “I am innocent”

   Now answer the following questions:
   (a) If A spoke the truth and B lied, who is innocent and who copied?
   (b) If everyone is innocent, who told the truth and who lied?
   (c) If C lied and B told the truth, who is guilty?

3. Write out a logical expression, a truth table, and a Boolean circuit all of which realize the function “if s then p else not q.”

4. Prove that \{→, ¬\} is logically complete. Hint: use the fact that \{∧, ∨, ¬\} is logically complete.

5. Prove that \{∧, ∨\} is not logically complete. Hint: show that a simple boolean function cannot be realized using just these two.