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 $\{\rightarrow, \neg\}$ is logically complete.* Hint: use the fact that $\{\wedge, \vee, \neg\}$ is logically complete.

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