1. (3 points) Let $h$ = “Maia is healthy”, $w$ = “Maia is wealthy” and $s$ = “Maia is wise”. Write the following statements in symbolic form:
   (a) Maia is healthy and wealthy, but she is not wise.
   (b) Maia is not wealthy, but she is healthy and wise.
   (c) Maia is neither healthy, wealthy nor wise.

2. (4 points) Construct truth tables for each of the following compound propositions.
   (a) $(p \lor q) \land \neg(p \lor q)$
   (b) $(q \lor p) \rightarrow (q \oplus p)$

3. (6 points) Do Exercise 1.1.22, that is, do Exercise 22 on page 13 (Section 1.1) of our text.

4. (6 points) Prove or give a counterexample to the following commonly used “rules of inference”. That is, which of the following compound propositions are tautologies?
   (a) $(q \land (p \rightarrow q)) \rightarrow p$ (abduction)
   (b) $(p \lor \neg p)$ (law of the excluded middle)
   (c) $(p \rightarrow q) \rightarrow (q \rightarrow p)$ (symmetry of implication)

5. (6 points) Show that $q \land p$ and $p \land (\neg p \lor q)$ are logically equivalent without using truth tables. Use the rules in TABLE 5.

6. (5 points) Do Exercise 1.3.10. Do not use the definition of the cardinality of a set. As a hint, to show that exactly two people satisfy a predicate $P$ you can show that at least two people satisfy $P$ and at most two people satisfy $P$. 