CS2022/MA2201
HW#1

DUE: Tuesday, August 31

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) $(p \vee q) \wedge \neg(p \vee q)$
   - (b) $(q \vee p) \rightarrow (q \oplus p)$

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)	$(q \wedge (p \rightarrow q)) \rightarrow p$	(abduction)
(b)	$(p \vee \neg p)$	(law of the excluded middle)
(c)	$(p \rightarrow q) \rightarrow (q \rightarrow p)$	(symmetry of implication)

5. (6 points) Show that $q \wedge p$ and $p \wedge (\neg p \vee q)$ 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*.