CS2022/MA2201
HW#1

DUE: Tuesday, September 2

1. (6 points) Do **Exercise 1.1.8**, that is, **Exercise 8** on page 11 in Section 1.1

2. (4 points) Construct truth tables for each of the following compound propositions.

a) $(p \vee q) \wedge (p \vee r)$

b) $(q \vee p) \leftrightarrow (q \oplus p)$

3. (9 points) **a**) Prove or give a counterexample to "the transitivity of implication",

$$\big((p \to q) \wedge (q \to r)\big) \to (p \to r) \ .$$

That is, is the above compound proposition a tautology?

b) Prove or give a counterexample to "the transitivity of conjunction", that is,

$$\big((p \wedge q) \wedge (q \wedge r)\big) \to (p \wedge r) \ .$$

c) Prove or give a counterexample to "the transitivity of exclusive-or", that is,

$$\big((p \oplus q) \wedge (q \oplus r)\big) \to (p \oplus r) \ .$$

4. (2 points) Do **Exercise 1.2.16.**

5. (10 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.