Math 431 January 12, 2018

Assignment 1
(Due January 24)

Reading: (*from Reed*) Chapter 1

Problems: §1.4: #1, 10(a,b)

Additional Problems: 1. Let P, Q and R be statements. Construct truth tables for the compound statements:
a. $P \vee (Q \wedge R)$ and $(P \vee Q) \wedge (P \vee R)$
b. $P \implies (\sim R \implies R)$

2*a.* Conclude that the two compound statements in 1*a.* are equivalent: either both are true or both are false for every truth value of P, Q and R.
b. Conclude that if 1*b.* is a true statement, then P is a false statement.

3. Choose English language statements P, Q and R and write the two corresponding (grammatically correct) English sentences corresponding to the logical formats in 1.

4. Use the equivalences $P \implies Q \equiv \sim P \vee Q$, $\sim\sim P \equiv P$ and $\sim (P \wedge Q) \equiv \sim P \vee \sim Q$ to prove that
a. $P \implies Q \vee R \equiv P \wedge \sim Q \implies R$, and
b. $P \wedge Q \implies R \equiv P \implies (Q \implies R)$

5. Use truth tables to determine whether or not the following argument is correct:

"If the tax rate and the unemployment rate both go up, then there will be a recession. If the GNP goes up, then there will not be a recession. The GNP and taxes are both going up. Therefore, the unemployment rate is not going up."

In other words, decide whether the concluding statement must be true, given that the preceding compound statements are true.

6. Do 5. without truth tables: reason it out.