Modul 04-006-1001: **WiSe 2023-2024**
Formale Grundlagen (Logik)

Excercises 6

Excercise 1: Translation into statement logic

- Translate the following English sentences into statement logic. Use lower case letters for atomic statements and provide the "key" to your translation, i.e., say which atomic symbols correspond to which English sentences. (In some cases you may want to slightly change the English sentences.)
- Example: *If John is at the party, then Mary is, too*; translation: $(p \to q)$; key: p: "John is at the party.", q: "Mary is at the party."

(1)
a. Either John is in that room, or Mary is, and possibly they both are.
b. The fire was set by an arsonist, or there was an accidental explosion in the boiler room.
c. When it rains, the streets get wet.
d. Sam wants a dog, but Alice prefers cats.
e. If Steve comes home late and has not had any supper, we will reheat the stew.
f. Clarence is well educated only if he can read Chuvash.
g. Marsha won't go out with John unless he shaves his beard and stops drinking.
h. The stock market advances when public confidence in the economy is rising and only then.
i. A necessary but perhaps not sufficient condition for negotiation to commence is for Barataria to cease all acts of agression against Titipu.

Excercise 2: Translation and ellipsis

- The following sentences contain various sorts of ellipsis, so that some of the connectives appear not to be connecting whole statements. Translate them into statement logic (by transforming them into non-elliptic English versions first).

(2)
a. John and Bill are going to the movies, but not Tom.
b. Susan doesn't like squash or turnips.
c. If neither Peter nor Fred is going to the party, then neither will I.
d. If Mary hasn't gotten lost or had an accident, she will be here in five minutes.
e. A bear or a wolf frightended the boys.
f. A party or a softball game would have amused the children.

Excercise 3: Computing truth values

- Let p, q and r be True, and let s be False. Find the truth values of the following statements.

(3)
a. $((p \wedge q) \wedge s)$
b. $(p \wedge (q \wedge s))$
c. $(p \to s)$
d. $(s \to p)$
e. $((p \wedge q) \leftrightarrow (r \wedge (\neg s)))$
f. $(p \to (q \leftrightarrow (r \to s)))$