Tik-79.144 **Syksy 1998**
Logic in Computer Science: Foundations
Exercise 5
13. ja 15.10.1998

1. Examine if the given claims hold using semantic tableaux. If not, justify by giving a valuation where the claim doesn't hold (a counter example)

a) $\models (A \rightarrow (B \rightarrow C)) \rightarrow ((A \rightarrow C) \rightarrow (A \rightarrow B))$

b) $\models (\neg B \rightarrow (A \rightarrow C)) \rightarrow (A \rightarrow (B \vee C))$

2. One successful application of expert systems has been analyzing the problem of which chemical syntheses are possible. Consider the following chemical reactions:

(1) $\mathrm{MgO} + \mathrm{H_2} \rightarrow \mathrm{Mg} + \mathrm{H_2O}$

(2) $\mathrm{C} + \mathrm{O_2} \rightarrow \mathrm{CO_2}$

(3) $\mathrm{CO_2} + \mathrm{H_2O} \rightarrow \mathrm{H_2CO_3}$

a) Represent these rules and the assumptions that we have some $\mathrm{MgO}, \mathrm{H_2}, \mathrm{O_2}$ and C by propositional logic formulas.

b) Give a resolution proof that we can get some $\mathrm{H_2CO_3}$.