Tik-79.144 **Syksy 1999**
Logic in Computer Science: Foundations
Exercise 7

1. We define predicates $L(x, y)$ (there is a flight from city x to city y) and $Y(x, y)$ (there is a connection from city x to city y) in following way:

$$\forall x \forall y (L(x, y) \rightarrow L(y, x))$$
$$\forall x \forall y (L(x, y) \rightarrow Y(x, y))$$
$$\forall x \forall y \forall z (Y(x, y) \wedge L(y, z) \rightarrow Y(x, z))$$

Write a database (using predicate logic) which states that there is a flights from Helsinki to London, Rovaniemi and New York, that there is a flight from New York to Paris and that there is a flight from Petersburg to Berlin. Use semantic tableaux to prove that there is a connection between Rovaniemi and New York.

2. We know that

(i) All guilty persons are liars.

(ii) At least one of the accused is also a witness.

(iii) No witness lies.

Prove that all accused are not guilty. Use semantic tableaux.