## Exercises – Semantic Tableaux Method

**Exercise 1**

Using the semantic tableaux method decide what kind (consistent, inconsistent, valid) of formula is .

If  is consistent, find all its models.

1.;

2.;

3.;

4.;

5.;

6.;

7.;

**Exercise 2**

Prove that the following formulas are tautologies using the semantic tableaux method:

1.distribution of ’’ over ’’: ;

2.separation of the premises law: ;

3.distribution of ’’ over ’’: ;

4.distribution of ’’ over ’’: ;

5.reunion of the premises law: ;

6.distribution of implication:;

7.distribution of ’’ over ’’: .

8.permutation of the premises law:;

**Exercise 3**

Using the semantic tableaux method, decide whether the following logical consequences hold or not.

If a logical consequence does not hold find an anti-model of it.

1.

2.

3.

4.

5.

6.

7.

8.

**Exercise 4**

Write all the anti-models of the propositional formulas  using the semantic tableaux method.

1.;

2.;

3.;

4.;

5.;

6.;

7.;

Exercise 5.

Check whether the conclusion  is a logical consequence of the set of hypotheses using

the semantic tableaux method.

*Hypotheses*:

. All hummingbirds are richly colored.

. No large birds live on honey.

. Birds that do not live on honey are dull in color.

*Conclusion*: C. All hummingbirds are small.

**Exercise 6**

Check whether the conclusion  is a logical consequence of the set of hypotheses using

the semantic tableaux method. ?

*Hypotheses*:

. Any Computer Science student likes *logic* and likes any programming language.

. Someone who likes *logic* is a Computer Science student or a Philosophy student.

. *Java* is a programming language.

. *John* does not like *Java* but he likes *logic*.

*Conclusion*: *C*. John is a Philosophy student but he is not a Computer Science student.

**Exercise 7**

Using the semantic tableaux method, prove the following properties in predicate logic:

1.’’ is semi-distributive over ’’:

 and



2.’’ is semi-distributive over ’’:

 and



3.’’ is semi-distributive over ’’:

 and



4.’’ is semi-distributive over ’’:

 and



5. and



6.’’ is distributive over ’’



7.’’ is distributive over ’’

