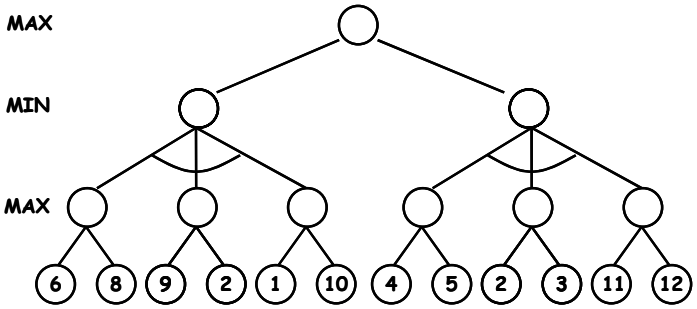
Course: **010 595 001 - ARTIFICIAL INTELLIGENCE**

Lecturer: Jan VORACEK Examination date: 19.10.2001

Notes: a) *students can use an English dictionary, calculators and any other tools or literature are disabled*
b) type, please, your answers in English

Example 1.

a) Mark branches, which will be pruned in the following *MAXMIN* tree?



Example 2.

Explain the following terms:

a) Simulated annealing
b) Bayes' law
c) K-fold cross-validation

Example 3.

Consider the following set of Prolog facts and rules:

```
male(john).
male(philip).
female(suzanne).
female(janette).
parent(suzanne,janette).
parent(suzanne,john).
parent(philip,janette).
parent(philip,john).

father(X,Y)  :- male(X),parent(X,Y).
sibling(X,Y) :- parent(Z,X),parent(Z,Y).
```

a) What will be Prolog's first answer to the query `sibling(john,X)` ?
b) What will be Prolog's first answer to the query `sibling(X, john)` ?

Example 4.

For a rule-based system with the following contents prove the goal **`switch_on_sprinklers`** using the backward chaining:

```
R1:   IF smoky AND hot THEN ADD fire
R2:   IF alarm_beeps   THEN ADD smoky
R3:   IF alarm_beeps   THEN ADD ear_plug
R4:   IF fire          THEN ADD switch_on_sprinklers
R5:   IF smoky         THEN ADD poor_visibility
F1:   alarm_beeps
F2:   hot
```

Draw the complete proof tree or use some other proper technique to document single steps of your solution. You can use any convenient inference heuristics, if properly justified in your answer.

Example 5

Fill completely, but only with answers GOOD or BAD (including implicitly also the modifier "*rather*", i.e. the answer GOOD means both good itself and rather good etc.), the following table:

	Expert systems	Fuzzy systems	Neural networks	Genetic algorithms
Knowledge representation				
Uncertainty tolerance				
Imprecision tolerance				
Adaptability				
Learning ability				
Explanation ability				
Knowledge discovery and data mining				
Maintainability				