Course: **010 595 002 - ARTIFICIAL INTELLIGENCE**

Lecturer: Jan VORACEK Examination date: 20.12.2002

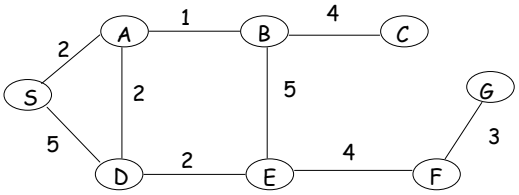
Notes: *a) Students can use an English dictionary and calculators. Any other tools or literature are disabled*
b) Type, please, your answers in English

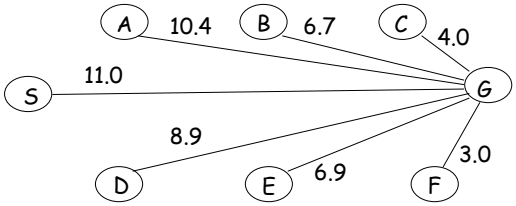
Example 1

a) Describe the main differences between/among four basic types of intelligent agents according to AIMA.
b) Characterize non-deterministic, inaccessible environment in general and give one real example of it.

Example 2

Let's have the following graph with start state *S* and goal state *G:*





a) Is the heuristic information from the right picture admissible? Explain! If not, make it admissible by changing the incorrect numbers.
b) Draw the complete, annotated search tree for *A** searching algorithm.

Example 3

a) What's wrong with the following Prolog program:

```
offspring(abraham, ishmael).
offspring(abraham, isaac).
offspring(isaac, esau).
offspring(isaac, jacob).

descendant(X, Z) :- offspring(X, Y), descendant(Y, Z).
```

b) When corrected, what is the third answer to the following query:

```
?- descendant(abraham, X).
```

Example 4

For a knowledge base including the following set of rules and facts:

Facts	**Rules**
A B	R1: IF A AND B THEN D R2: IF B THEN C R3: IF C AND D THEN E

demonstrate graphically and explain briefly principles and features of approaching the goal *E* using:

a) Forward chaining
b) Backward chaining

Example 5

Select an arbitrary technique suggested in lectures and extract knowledge in the form of *IT-THEN* rules from the following data set:

	Attr_1	**Attr_2**	**Class**
A:	Ordinary	Retired	2
B:	Fellow	Employed	10
C:	Associate	Employed	3
D:	Ordinary	Unemployed	1
E:	Fellow	Retired	2
F:	Fellow	Unemployed	1
G:	Ordinary	Employed	5
H:	Associate	Unemployed	1
I:	Associate	Retired	2

Justify your solution! Keep on mind that the resultant knowledge must be compact, i.e. the total number of rules should be as small as possible.