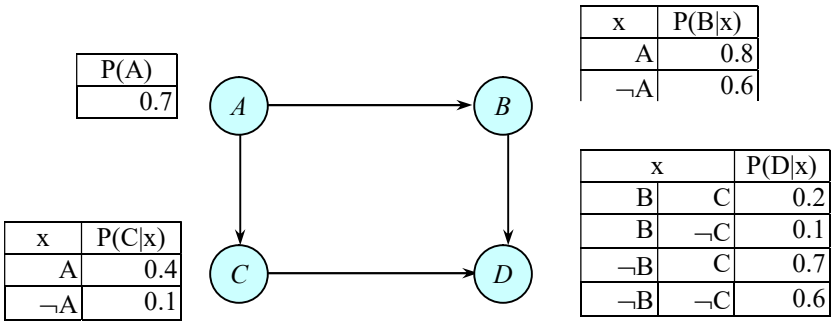
Laboratory assignment no. 3

Probability calculation in a probabilistic network using the stochastic modeling algorithm

Given. A probabilistic network is given in external memory (file). The probabilistic network in a file is represented based on these principles:

- A single line of file is dedicated to a single network node (variable);
- The order of nodes representation is from "Parents" to "Children". If an ordinary node is represented in a line of the file, it means, that all of the parents of this node are already represented in previous lines of the file.
- The line of the file, that represents the network root node has this structure: variable name, number of its parents, its parents indexes in the file, a list of conditional probabilities, starting with FF...FF, FF...FT, FF...TF, FF...TT and ending with the TT...TT case.



P(A)
0.7

x	P(B|x)
A	0.8
¬A	0.6

x	P(C|x)
A	0.4
¬A	0.1

x		P(D|x)
B	C	0.2
B	¬C	0.1
¬B	C	0.7
¬B	¬C	0.6

E.g., the probabilistic network displayed above would be represented in a file this way:

```
A 0     0.7
C 1 0   0.1 0.4
B 1 0   0.6 0.8
D 2 2 1 0.6 0.7 0.1 0.2
```

Required: Write a program, that would:

- Read a given probabilistic network from a file to computer memory;
- Inquire what probability is of interest to the user (e.g. P(D), P(A|C, ¬B) or similar) and how many iterations does the user want to calculate;
- Calculate the probability of interest to the user, gained using the stochastic likelihood weighting method, described in S. Russell and P. Norvig textbook „Artificial Intelligence: A Modern Approach“ p. 514-515 (2 edition), p. 532-534 (3 edition);
- Present the answer to the user.

Notes:

- The program can be in a console or with a GUI;
- The program must be able to calculate the probability of a single variable, i.e. do not examine cases like e.g. P(A, D | C, ¬B).