Homework 4, AI course

This homework covers chapter 13, 14 and 16 in AIMA.

The homework is due by midnight Friday October 12. You report it by emailing your written report (either as a PDF file or as a MS Word file) to the examiner (TR).

Each homework assignment handed in on time gives one bonus-point for the oral exam. Homework handed in too late gives no bonus-points but each student must hand in all homework before the oral exam (or else he/she will not be allowed to take the oral exam).

Read Chapters 13, 14 (not 14.6 and 14.7) and 16 in AIMA.

1. Exercise 13.5 AIMA
2. Exercise 13.8 AIMA
3. Exercise 13.15 AIMA
4. Exercise 14.2 AIMA
5. Exercise 14.3 AIMA
6. Design a Bayesian network for the game of Poker similarly to the one found on http://www.hugin.com/developer/Samples/Poker_Game/. The task for the Bayesian network should be to determine the posterior probability that your hand is better than the opponent's, given the number of cards changed by each player (one change is allowed per player) and the number of raises made by the players. This means that you should:
   (a) Draw a graph with nodes and directed arcs, with symbols and explanations what they denote.
   (b) Indicate the type of distribution that is produced by each node, i.e. boolean, discrete, or continuous.
   (c) Indicate the probabilities involved (not necessarily computing them but describing how they should be computed).
   (Note 1: There is no "correct answer" here; you are supposed to provide your opinion on this.
   Note 2: You are not required to implement the Bayesian network.)
7. The table below shows how many "Triss" lottery tickets that gave a winning (for February 2004). Each lottery ticket costs 25 SEK. Compute the expected value of a lottery ticket (i.e. how much money you are expected to win on a lottery ticket). Is buying a lottery ticket a rational decision? If yes, is the person who buys a lottery ticket risk-averse or risk-seeking?

Number of tickets	Winning (SEK)
10	2 500 000
40	250 000
10	1 000 000
10	200 000
40	100 000
20	20 000
400	10 000
1 400	2 000
2 200	1 000
1 500	750
2 000	500
5 000	250
4 500	200
12 500	150
95 000	100
300 000	75
2 094 000	50
1 670 000	25

Table 1 *The number of lottery-tickets that gave a winning out of 20 000 000 lottery tickets (for the Triss lottery from Svenska Spel, February 2004).*