Assignment 2 of IntroAI
Due date: Nov 8, 2022, 11:55 pm.
Weight: 8% of the final marks

Important Notes:

1. This assignment must be completed with an individual effort. You can refer resources on the web or discuss with fellow students, but the writing and answering the questions must be your own effort. Cross-checking your answers using software will be performed to detect possible cheating.
2. These questions may be somewhat similar to the potential questions in the midterm and final exams, thus careful thinking and completion of these questions would be very helpful in order to do well in exams, and to understand the materials of the course well.
3. You only need to answer 8 questions (and we will only mark the first 8, if you submit solutions to more questions). As such, we may add more questions after the assignment is posted to give you more selection. **Please specify which questions you are answering in your submission.**

Choose any 8 questions to answer. Each question is 1%.

Most questions below are drawn from the questions in Chapters 5 and 13 of the textbook. For some questions, you may need to make some realistic assumptions. Write down your assumptions clearly.

5.2

5.6

5.8 (d can be ignored)

5.9 (Question a. means how many different ways of playing the game to the end).

5.12 (can illustrate with examples)

5.16

5.18

5.20

In the second last slide (Alpha-beta quiz 2) of the slides, how would you switch orders of the branches to get max/min alpha-beta pruning? What potential values in the terminal nodes so that you can get max/min alpha-beta pruning?

Local search (programming):
Generate a large number of 8-puzzle and n-queens (with large n) instances and solve them (where possible) by hill climbing (steepest-ascent and its some variants) and hill climbing with random restart. Measure the search cost and percentage of solved problems. Comment on your results.

13.8

	toothache		*¬toothache*	
	catch	*¬catch*	*catch*	*¬catch*
cavity	0.108	0.012	0.072	0.008
¬cavity	0.016	0.064	0.144	0.576

Figure 13.3 A full joint distribution for the Toothache, Cavity, Catch world.

13.13

13.15

13.18

13.21

14.8

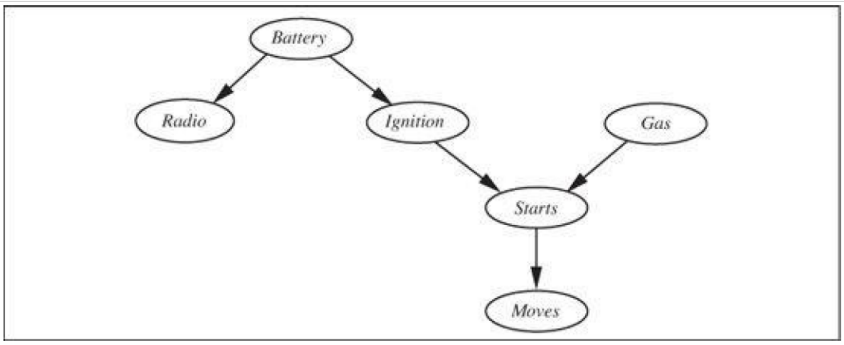

Figure 14.21 A Bayesian network describing some features of a car's electrical system and engine. Each variable is Boolean, and the true value indicates that the corresponding aspect of the vehicle is in working order.

14.8 Consider the network for car diagnosis shown in Figure 14.21.

a. Extend the network with the Boolean variables *IcyWeather* and *StarterMotor*.

b. Give reasonable conditional probability tables for all the nodes.

c. How many independent values are contained in the joint probability distribution for eight Boolean nodes, assuming that no conditional independence relations are known to hold among them?

d. How many independent probability values do your network tables contain?

To submit: submit your answer in one PDF file via OWL. You could include drawing and handwriting etc in the file but make sure they must be clearly viewable or marks can be deducted.