Kafrelsheikh University
Faculty of Engineering
Electrical Engineering Department
Exam: 2019 -2020
Subject: Artificial Intelligence

4th Year (Computer Engineering & systems)
Date: 9 / 1 / 2020, 3 pages
Time: 3 Hours. Mark: 90
Academic Number: ECS4125
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This exam measures ILOs no: a1, a4, a5, a12, a13, a16, a17, b1, b2, b3, b7, b12, b17, c1, c2, c7, c14, c15, d1, d2, d3,d4

Question #1: True or False [12 Marks]

a) If A and B are dependent variables then P(A,B)=P(A)*P(B). ( )
b) Uniform-cost search is a complete searching algorithm. ( )
c) "Connect four" game is considered as fully observable and discrete in AI terminology ( )
d) Breadth first search saves more memory than Depth first search. ( )
e) Robot car is considered as stochastic and discrete in AI terminology. ( )
f) The searching algorithm is optimal if it is able to find the goal at the optimal path with respect to the frontiers selection criteria. ( )

Question #2:Choose the correct answer [12 Marks]

1- What is Artificial intelligence?

a) Putting your intelligence into Computer b) Programming with your own intelligence
c) Making a Machine intelligent d) Playing a Game e) Putting more memory into Computer

2- An 'agent' is anything that,

a) Perceives its environment through sensors and acting upon that environment through actuators
b) Takes input from the surroundings and uses its intelligence and performs the desired operations
c) A embedded program controlling line following robot
d) All of the mentioned

3- A search algorithm takes _____ as an input and returns _____ as an output.

a) Input, output b) Problem, solution
c) Solution, problem d) Parameters, sequence of actions

4- The major component/components for measuring the performance of problem solving

a) Completeness b) Optimality
c) Time and Space complexity d) All of the mentioned

5- Which instruments are used for perceiving and acting upon the environment?

a) Sensors and Actuators b) Sensors
c) Perceiver d) None of the mentioned

6- What is state space?

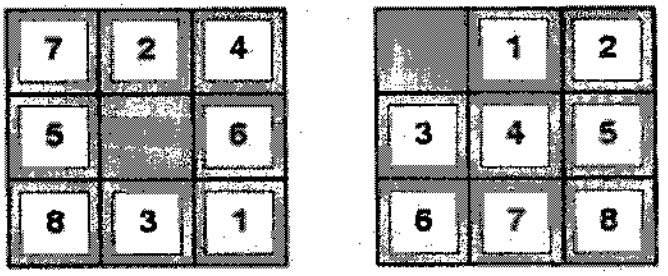
a) The whole problem b) Your Definition to a problem
c) Problem you design d) Representing your problem with variable and parameter
e) A space where you know the solution

Question # 3: Answer by explanations [36 Marks]

1. How can you design a simple neural network with two inputs perceptron that acts as an *AND* gate, using step operator with learning rate 0.1 and bias input is -0.2, the initial random weights are W_1=0.3 and W_2= -0.1. [10 Marks]

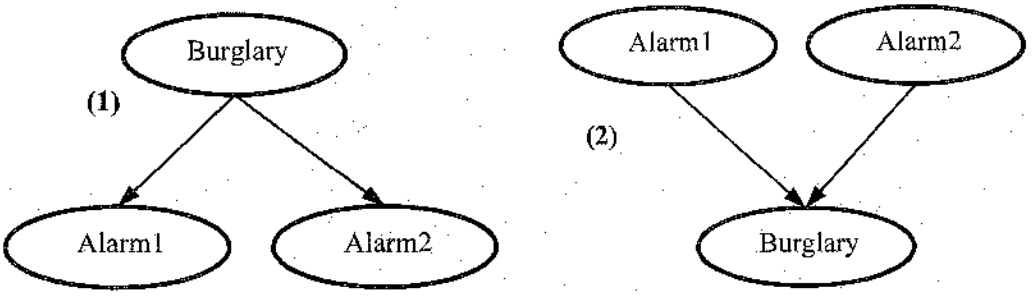
2. **An economics consulting firm has created a model to predict recessions. The model predicts a recession with probability 80% when a recession is indeed coming and with probability 10% when no recession is coming. The unconditional probability of falling into a recession is 20%. If the model predicts a recession, what is the probability that a recession will indeed come? [6 Marks]**

3. **In the following 8-puzzle state space representation. Determine states, Initial states, actions, goal test path cost, and solution. [5 Marks]**



4. **To safeguard your house, you recently installed two different alarm systems by two different reputable manufacturers that use completely different sensors for their alarm systems. [15 Marks]**

a) Which one of the two Bayesian networks given below makes independence assumptions that are not true? Explain all of your reasoning. ***Alarm1 means that the first alarm system rings, Alarm2 means that the second alarm system rings, and Burglary means that a burglary is in progress.***



b) Consider the first Bayesian network (1). How many probabilities need to be specified for its conditional probability tables?

c) Consider the second Bayesian network. Assume that:

P (Alarm1) = 0.1

P (Alarm2) = 0.2

P(Burglary | Alarm1, Alarm2) = 0.8

P(Burglary | Alarm1, ¬ Alarm2) = 0.7

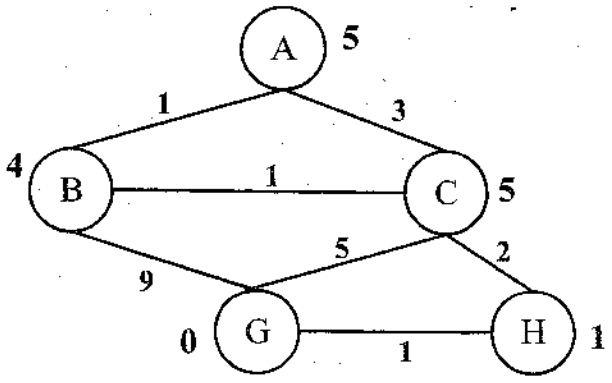
P(Burglary | ¬ Alarm1, Alarm2) = 0.6

P(Burglary | ¬ Alarm1, ¬ Alarm2) = 0.5

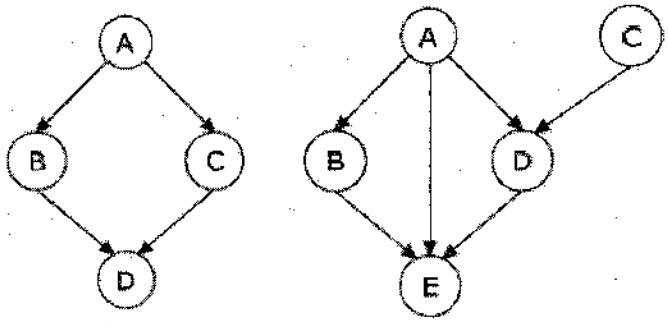
Calculate P(Alarm2 | Burglary, Alarm1). Show all of your reasoning.

Question # 4: Answer by explanations and drawing [30 Marks]

1. Consider the graph shown below where the numbers on the links are link costs and the numbers next to the states are heuristic estimates. Note that the arcs underlines. Let A be the start state and G be the goal state. [20 Marks]



2. Consider the following Bayes networks, how many parameters are necessary to specify the joint distribution of all variables? [10 Marks]



********** Good Luck**********

Dr. Wessam Fikry, Committee of Correctors and Testers