Question **1**

Complete

Marked out of 1.0

Flag question

With reference to PAGE description, what are the percepts of a delivery drone?

- a. The operator's hands entering the delivery address
- b. Tilt, acceleration, orientation, location
- c. Deliver the parcel, minimize delivery time
- d. Parcels, buildings, birds
- e. Propellers, parcel grabber, landing mechanism
- f. Fly, follow the path, avoid obstacles

Question **2**

Complete

Marked out of 1.0

Flag question

The environment for a delivery drone is:

- a. Situated, dynamic, partially observable, stochastic
- b. Situated, dynamic, partially observable, deterministic
- c. Situated, static, partially observable, stochastic
- d. Simulated, dynamic, partially observable, stochastic
- e. Simulated, dynamic, fully observable, stochastic

Question **3**

Complete

Marked out of 1.0

Remove flag

What type of agent would be the most apropriate for a sudoku solver:

- a. Game Playing Agent
- b. Planning Agent
- c. Reactive Agent
- d. Model-Based Agent

Question **4**

Complete

Marked out of 1.0

Flag question

Which algorithms use a priority queue as a frontier?

- a. A* Search, Iterative Deepening A* Search, Greedy Best-First Search
- b. Iterative Deepening A* Search, Uniform-Cost Search, Greedy Best-First Search
- c. A* Search, Greedy Best-First Search, Uniform-Cost Search
- d. A* Search, Iterative Deepening A* Search, Uniform-Cost Search

Question **5**

Complete

Marked out of 1.0

Flag question

Uniform Cost Search (UCS) is guaranteed to be optimal:

- a. If its heuristic is admissible and consistent
- b. Never
- c. If all arcs have the same path cost
- d. If path cost is consistent
- e. Always

Question **6**

Complete

Marked out of 1.0

Remove flag

Is Iterative Deepening Search (IDS) guaranteed to find an optimal solution for the Romania Map problem?

- a. No, because it can get stuck in an infinite loop
- b. No
- c. Yes, if the heuristic is admissible
- d. Yes, because the path cost is a non-decreasing function of depth

Question 7
Complete
Marked out of 1.0
Remove flag

Consider two admissible heuristics, h1 and h2.

Which of the following is also guaranteed to be admissible:

?

- a. max(h1, h2)
- b. min(h1, h2), h1+h2, a*h1 + (1-a)*h2 for a ∈ [0, 1]
- c. h1*h2, min(h1, h2), max(h1, h2)
- d. min(h1, h2), h1+h2

Question 8
Complete
Marked out of 1.0
Remove flag

Consider the cryptarithmetic problem: TWO + TWO = FOUR.

If you model this problem as a Constrain Satisfaction Problem (CSP), at which depth of the search tree would the solution be found?

C {T, W, O, F, U, R}

- a. 10
- b. 13
- c. 6
- d. 3
- e. 26

Question 9
Complete
Marked out of 1.0
Flag question

Consider three random variables, A, B and C.

You know that P(A|B) = 0.7 and P(A|B, C) = 0.7. Which of the following describes the relationship between A and C?

C

- a. Disjoint
- b. Independent
- c. Conditionally independent
- d. Static

Question 10
Complete
Marked out of 1.0
Flag question

Breadth-First Search (BFS), Depth-First Search (DFS) and Uniform-Cost Search (UCS) can all l

A.

- a. Best-First Search
- b. Bidirectional Search ✗
- c. Depth-Limited Search ✗
- d. Iterative Deepening Depth-First Search ✗

Question 11
Complete
Marked out of 1.0
Remove flag

Two actions of a planning agent are mutually exclusive if:

D

- a. One action must be executed prior to the execution of another
- b. The execution of either action can affect the state space
- c. Both actions have common effects
- d. The effects of one action negatives the precondition of another action

Question 12
Complete
Marked out of 1.0
Flag question

STRIPS planning algorithm assumes that the environment is:

D

- a. Single-agent
- b. Single-agent, fully-observable, deterministic
- c. Single-agent, deterministic
- d. Fully-observable, deterministic

Question **13**
Complete
Marked out of 1.0
Flag question

The main drawback of forward planning is that:

B

- a. It might fail to find a solution
- b. It requires a lot of computational power at each node and may fail to find a solution
- c. Its generates a large search space
- d. It requires a lot of computational power at each node

Question **14**
Complete
Marked out of 1.0
Flag question

In a Constraint Satisfaction Problem (CSP), if every value of a variable in its domain satisfies the variable's binary constraints, it's said to be one of the following:

B

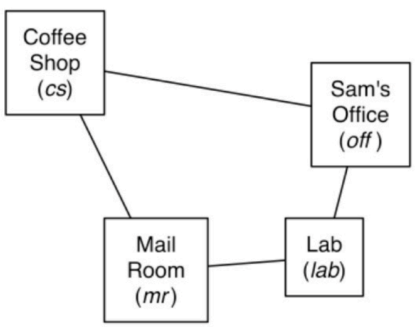
- a. Globally consistent
- b. Arc consistent
- c. Path consistent
- d. Node consistent

Question **15**
Complete
Marked out of 1.0
Flag question

Consider the planning domain shown in the figure below:

Features:
RLoc – Rob's location
RHC – Rob has coffee
SWC – Sam wants coffee
MW – Mail is waiting
RHM – Rob has mail

Actions:
mc – move clockwise
mcc – move counterclockwise
puc – pickup coffee
dc – deliver coffee
pum – pickup mail
dm – deliver mail



Which STRIPS representations is correct for the pickup email action?

B

- a. Preconditions: (RLoc = off) ^ rhc , Effects [¬rhm]
- b. Preconditions: (RLoc = mr) ^ mw , Effects: [¬mw,rhm]
- c. Preconditions: (RLoc = cs) ^ rhc, Effects: [rhc]
- d. Preconditions: (RLoc = off) ^ rhm , Effects: [¬rhm]

Question **16**
Complete
Marked out of 1.0
Flag question

In decision tree learning using Laplace error, the pruning of child nodes belonging to some node *n* is performed when:

C

- a. The weighted average Laplace error of the child nodes is less than the Laplace error of the node *n*
- b. The maximum Laplace error of the child nodes is greater than the Laplace error of the node *n*
- c. The weighted average Laplace error of the child nodes is greater than the Laplace error of the node *n*
- d. The minimum Laplace error of the child nodes is less than the Laplace error of the node *n*

Question **17**
Complete
Marked out of 1.0
Flag question

Which of the statements below are equivalent?

C

1. P ∨ Q ∨ R
2. (¬P ∧ ¬R ∧ (Q→R)) → Q
3. (¬P ∧ ¬R ∧ (R→Q)) → Q
4. (¬P ∧ ¬R ∧ (R→P)) → Q

- a. 1 and 2
- b. 1 and 4
- c. All are equivalent
- d. 1 and 3

Question **18**
Complete
Marked out of 1.0
Flag question

Which expression is logically equivalent to the sentence "Dogs don't eat and play if they are sick"

- a. ∀x Dog(x) → ((¬(Eat(x) ∧ Play(x))) → Sick(x))
- b. ∀x Dog(x) → ((¬(Eat(x) ∨ Play (x))) → Sick(x))
- c. ∃x Dog(x) → ((¬Eat(x) ∧ ¬Play(x))→ Sick(x))
- d. ∀x Dog(x) → (¬Eat(x) ∧ ¬Play (x) ∧ Sick(x))

B

Question **19**
Complete
Marked out of 1.0
Flag question

Reinforcement Learning is when an agent is:

A

- a. Given a reward signal that it needs to maximise instead of being presented with target outputs
- b. Only presented with the inputs so it must aim to find structure within these as it does not have access to the corresponding target outputs
- c. Presented multiple times (over time) with the same examples of inputs and their target outputs
- d. Presented only once with examples of inputs and their target outputs

Question **20**
Complete
Marked out of 1.0
Flag question

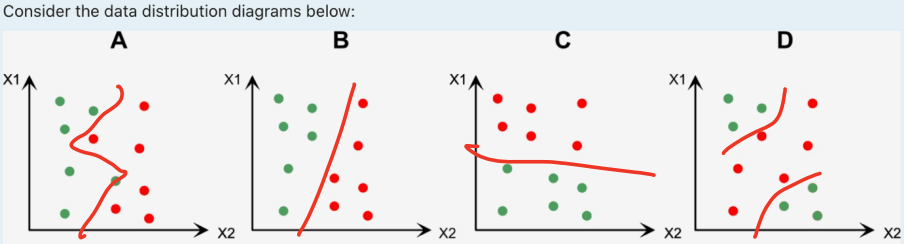
The principle "The most likely hypothesis is the simplest one consistent with the data" is called:

B

- a. Overfitting
- b. Occam's Razor
- c. Resolution by refutation
- d. Entropy minimisation

Question **21**
Complete
Marked out of 1.0
Flag question

Consider the data distribution diagrams below:



In what case is it possible to construct a perceptron that correctly classifies all data samples that belong to either the green or red class?

B

- a. A, C
- b. B, C
- c. A
- d. A, B

Question **22**
Complete
Marked out of 1.0
Flag question

In propositional logic, if a knowledge base is a conjunction of clauses and each clause is a disjunction of literals (none, some or all of which are negated), then the knowledge base is in:

A CNF

- a. Conjunctive Normal Form
- b. Disjunctive Normal Form
- c. Horn Clauses Form
- d. Selected literals Linear form Definite clauses

Question **23**
Complete
Marked out of 1.0
Remove flag

It is possible to construct a decision tree that correctly classifies all data samples if:

A

- a. The number of attributes is smaller than the number of classes
- b. The branching factor is equal to the number of attributes
- c. The number of classes is smaller than the number of attributes
- d. The data samples are consistent

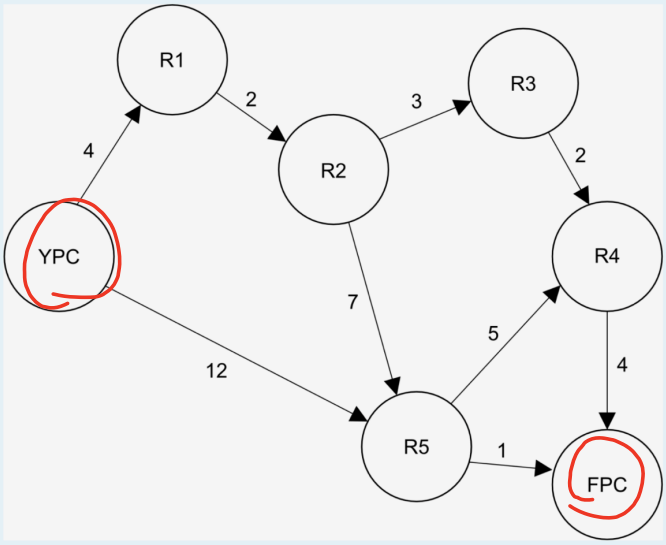
Question **24**

Complete

Marked out of 1.5

Flag question

Consider the network of routers (R1, R2, R3, R4 & R5) illustrated in the diagram below:



You (YPC) and your friend (FPC) are connected to this network. The weights on the edges of the graph represent the time in milliseconds taken to receive a message. Assume that the system uses the Uniform Cost Search algorithm (UCS) to determine the fastest way that your message can reach your friend. When exploring the search space, what node will be explored immediately before R5?

- a. YPC
- b. R4
- c. It will not explore R5 as the solution is found earlier.
- d. R1
- e. R2

Question **25**

Complete

Marked out of 1.5

Flag question

Consider a dataset with three attributes A, B, C and the output class Y. Its probability distribution is shown in the table below:

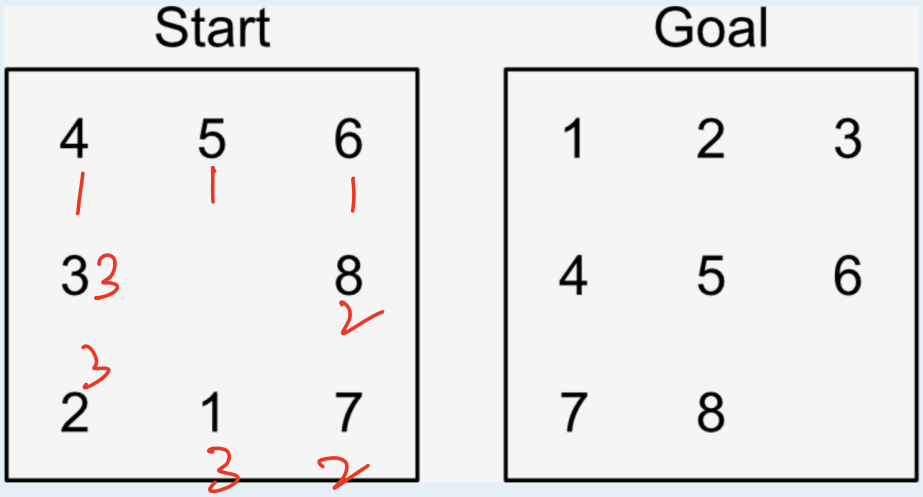
A	B	C	Y
0	2	2	0
0	1	0	0
0	2	1	0
0	1	1	0
1	1	1	0
1	2	2	0
1	1	0	1
1	1	1	1
2	2	1	1
2	1	0	1
2	2	2	1
2	1	1	1

What is P(A, B, C=0 | Y=1) equal to?

- a. 1/6
- b. 1/3
- c. 2/3
- d. 1/2

Question **26**
Complete
Marked out of 1.5
Flag question

Consider the arrangement of tiles in the 8-puzzle shown below:



Compare the state state (left) to the goal state (right).

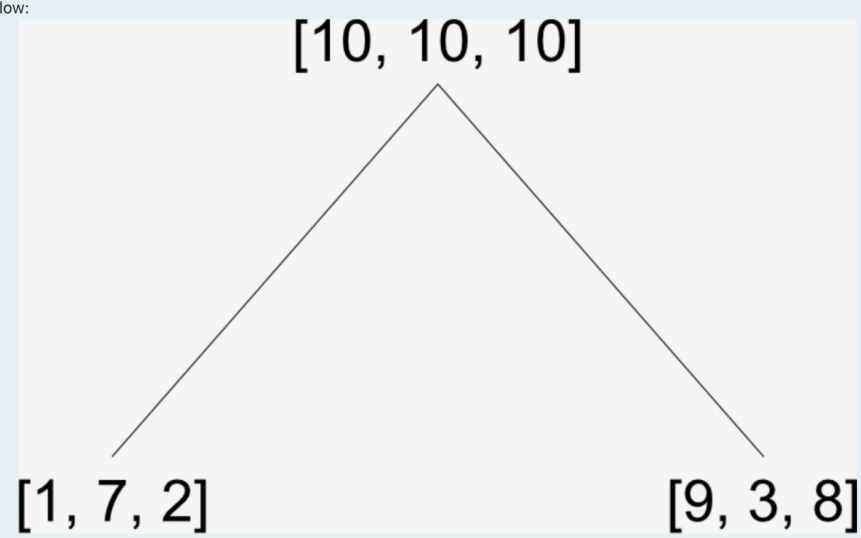
What is the Manhattan Distance Heuristic for this start state?

A.

- a. 16
- b. 13
- c. 14
- d. 15

Question **27**
Complete
Marked out of 1.5
Flag question

Consider the Decision Tree below:



What is the average Laplace error for the child nodes:

B.

$E(\text{left}) = 1 - \frac{n+1}{N+k} = 1 - \frac{7+1}{10+3} = 1 - \frac{8}{13} = 0.39$

$E(\text{right}) = 1 - \frac{10}{20+3} = 1 - \frac{10}{28} = 0.566$

$\text{child} = \frac{1}{3} \times 0.39 + \frac{2}{3} \times 0.566$

$= 0.13 + 0.377 = 0.507$

- a. 0.6
- b. 0.51
- c. 0.47
- d. 0.56

Question **28**

Complete

Marked out of 1.5

Flag question

Consider these two sentences based three proposition symbols A, B, C:

1. A→B∧¬C
2. ¬C∧¬B→A

What is the full list of models that satisfy both of these sentences?

- a. {A, B}, {B, C}
- b. {A}, {A, B}, {A, C}
- c. {B}, {C}, {B, C}, {A, B}
- d. {B}, {A, B}, {B, C}

Question **29**

Complete

Marked out of 1.5

Remove flag

Consider three different events as follows:

1. tutorial - student attends tutorials
2. lecture - student attends lectures
3. exam - student passes the exam

The probability table describing these events is below:

	lecture		¬lecture	
	tutorial	¬tutorial	tutorial	¬tutorial
exam	0.25	0.1	0.19	0.01
¬exam	0.01	0.02	0.2	0.22

Compute (to two decimal places) the following: P(exam | lecture ∨ tutorial).

- a. 0.70
- b. 0.51
- c. 0.59
- d. 0.56

Question **30**

Complete

Marked out of 1.5

Flag question

Consider a dataset of dogs with two attributes *size* and *colour*. Its output class is whether a dog is intelligent or not.

It is shown through the table below:

size	colour	intelligent
small	ginger	+
small	white	–
medium	black	–
medium	black	–
large	ginger	+
large	white	+

What is the entropy of the *size* attribute?

- a. 2/3
- b. 1/3
- c. 1/2
- d. 1/6

Question **31**

Complete

Marked out of 1.5

Flag question

Consider the following training examples for a perceptron:

Training example	x1	x2	Class
a	0	1	–1
b	2	0	–1

Suppose the initial weights are w0 = -0.5, w1 = 0, and w2 = 1, with a learning rate of 0.5.

What are the weights after training using the perceptron learning algorithm on training example (a)?

- a. w0 = -1.5, w1 = 0, w2 = 0
- b. w0 = -1.5, w1 = -1, w2 = 0
- c. w0 = -1, w1 = 0, w2 = 0.5
- d. w0 = -1.5, w1 = -0.5, w2 = 0.5

C

Question **32**

Complete

Marked out of 1.5

Flag question

Now suppose training continues with training example (b).

Training example	x1	x2	Class
a	0	1	–1
b	2	0	–1

What are the weights after the next training step?

- a. w0 = -1, w1 = 0, w2 = 0.5
- b. w0 = -1.5, w1 = 0, w2 = 0
- c. w0 = -2, w1 = 0, w2 = -0.5
- d. w0 = -1.5, w1 = -0.5, w2 = 0

A.

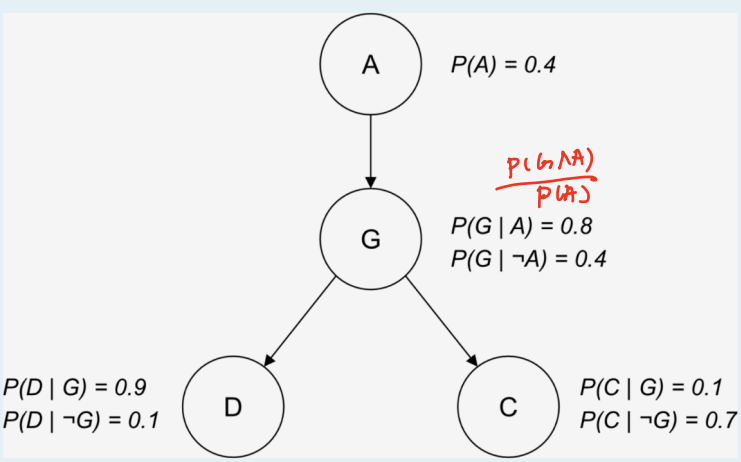
Question **33**

Complete

Marked out of 1.5

Remove flag

Consider the Bayesian Network below:



Where:

- A stands for "Anna is home"
- G stands for "playing a game"
- C stands for "happy cat"
- D stands for "happy dog"

What is P(C | ¬G, ¬D)?

$= P(C|\neg D) \times P(\neg D|\neg G)$

$= 1 \times 0.7 = 0.7$

- a. 0.7
- b. 0.36
- c. 0.56
- d. 0.1

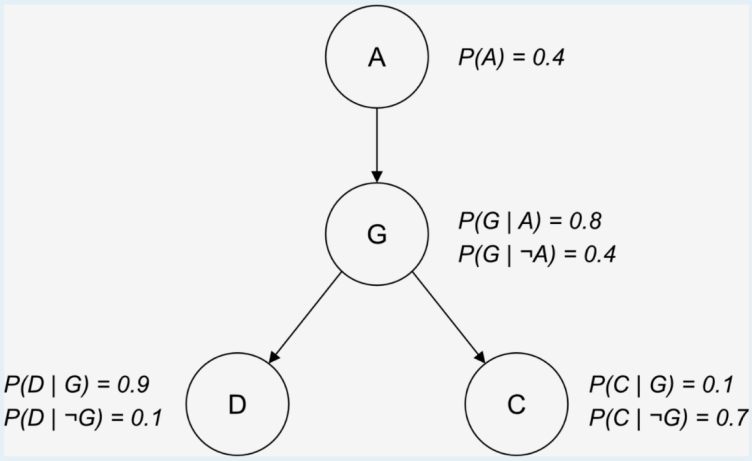
Question **34**

Complete

Marked out of 4.0

Flag question

Consider the Bayesian Network below:



Where:

- A stands for "Anna is home"
- G stands for "playing a game"
- C stands for "happy cat"
- D stands for "happy dog"

What is P(C)? Show your working

C is conditionally independent of D.
P(C) = P(C | A, G) + P(C|A, not G) + P(C | not A, G) + P(C| not A, not G)
= P(C | G) P(G|A) + P(C|notG) P(notG|A) + P(C|G) P(G|not A) + P(C|notG) P(notG|notA)
= 0.1 * 0.8 + 0.7 * 0.2 + 0.1 * 0.4 + 0.7 * 0.6
= 0.68