Assignment 12

The due date for submitting this assignment has passed. As per our records you have not submitted this assignment.

1) Which of the following terms are associated with Constraints Programming?

- CSP - Communicating Sequential Processes
- CSP - Constraint Satisfaction Problem
- BCN - Binary Constraint Network
- Constraint Network
- Matching Diagram
- Arc Consistency
- Path Consistency
- Scope of a Relation
- Domain
- Universal Constraint

No, the answer is incorrect. Score: 0

Accepted Answers:
- CSP - Constraint Satisfaction Problem
- BCN - Binary Constraint Network
- Constraint Network
- Matching Diagram
- Arc Consistency
- Path Consistency
- Scope of a Relation
- Domain
- Universal Constraint

2) A CSP is a triple \( <X, D, C> \) where ______

- \( X \) is a set of variables
- \( D \) is a set of domains
- \( D \) is a set of directions
- \( C \) is a set of relations
- \( C \) is a set of constants

No, the answer is incorrect. Score: 0

Accepted Answers:
- \( X \) is a set of variables
- \( D \) is a set of domains
- \( C \) is a set of relations

3) What is true about "domain" in a CSP?

- Domain refers to fields of interest like Banking, Insurance, Manufacturing, etc
- Domain in a CSP has the same meaning as domain in the phrase "domain expert"
- Domain is a set of values
- Two or more variables can have the same domain
- A variable can have two or more domains

No, the answer is incorrect. Score: 0

Accepted Answers:
- Domain is a set of values
- Two or more variables can have the same domain

https://onlinecourses.nptel.ac.in/noc20_cs81/unit?unit=65&assessment=232
4) A constraint-graph of a map coloring problem and four maps are shown below.

Select the correct options.

- Graph 1 corresponds to Map 1
- Graph 1 corresponds to Map 2
- Graph 1 corresponds to Map 3
- Graph 1 corresponds to Map 4

No, the answer is incorrect.
Score: 0
Accepted Answers:
Graph 1 corresponds to Map 2  
Graph 1 corresponds to Map 4

BEGIN GROUP

A map coloring problem, its constraint graph and domains are shown below. Model this problem as a CSP. And use this information to answer the following questions.

- $D_A = \{ r, b \}$
- $D_B = \{ r, b, g \}$
- $D_C = \{ r, b, g \}$
- $D_D = \{ r, g \}$
- $D_E = \{ b, g \}$
- $D_F = \{ r, b \}$

5) In the given CSP ________.

- there are 6 variables
- the domains contain values (symbols) that are interpreted as colors
- the edges in the constraint graph denote equality constraints
- the edges in the constraint graph denote inequality constraints
- two variables that are not explicitly connected by an edge carry an implicit edge that admits a universal constraint

No, the answer is incorrect.
Score: 0
Accepted Answers:
there are 6 variables  
the domains contain values (symbols) that are interpreted as colors  
exthe edges in the constraint graph denote inequality constraints  
two variables that are not explicitly connected by an edge carry an implicit edge that admits a universal constraint

6) Constraints of the form $R_{xy}$ are shown below

Replace the labels $X$ and $Y$ with appropriate variables to generate constraints for the given CSP. Now, identify the correct statements with respect to the map coloring problem defined above.

- $R_{BA}$ is an instance of Constraint 1
- $R_{AB}$ is an instance of Constraint 1
- $R_{BC}$ is an instance of Constraint 1
- $R_{CD}$ is undefined
- $R_{CD}$ is equal to $\{ <r, r>, <b, r>, <r, g>, <b, g> \}$
No, the answer is incorrect. Score: 0
Accepted Answers: 
- $R_{AB}$ is an instance of Constraint 1
- $R_{BC}$ is an instance of Constraint 1
- $R_{BC}$ is equal to $\{ <e,e>, <b,e>, <e,g>, <b,g> \}$

7) In continuation to question 6, replace the labels $X$ and $Y$ with appropriate variables to generate constraints for the above CSP. Identify the correct statements with respect to the map coloring problem defined above.

- $R_{AB}$ is an instance of Constraint 2
- $R_{BC}$ is an instance of Constraint 2
- $R_{BC}$ is undefined
- $R_{BC}$ is equal to $\{ <e,e>, <e,b>, <e,g>, <b,e>, <b,b>, <b,g>, <g,e>, <g,b>, <g,g> \}$

No, the answer is incorrect. Score: 0
Accepted Answers: 
- $R_{BC}$ is an instance of Constraint 2
- $R_{BC}$ is equal to $\{ <e,e>, <e,b>, <e,g>, <b,e>, <b,b>, <b,g>, <g,e>, <g,b>, <g,g> \}$

8) In continuation to question 6, replace the labels $X$ and $Y$ with appropriate variables to generate constraints for the above CSP. Identify the correct statements with respect to the map coloring problem defined above.

- $R_{BC}$ is an instance of Constraint 3
- $R_{BC}$ is an instance of Constraint 3
- $R_{BC}$ is undefined
- $R_{BC}$ is equal to $\{ <e,e>, <e,g>, <b,e>, <b,g> \}$

No, the answer is incorrect. Score: 0
Accepted Answers: 
- $R_{BC}$ is an instance of Constraint 3
- $R_{BC}$ is equal to $\{ <e,e>, <e,g>, <b,e>, <b,g> \}$

9) Which of the following are valid solutions for the given CSP? The variable ordering is $A, B, C, D, E, F$.

- $r, b, b, r, g, r$
- $r, b, b, g, r, g$
- $r, g, g, r, b, r$
- $b, r, r, b, g, b$
- $b, r, r, g, b, g$
- $b, g, g, r, b, r$

No, the answer is incorrect. Score: 0
Accepted Answers: 
- $r, b, b, r, g, r$
- $r, g, g, r, b, r$
- $b, g, g, r, b, r$

10) Which of the following are true about the given CSP?

- There are no solutions
- There are exactly 3 solutions
- There are more than 3 solutions
- There is a solution where $D$ is $g$
- There is no solution where $D$ is $g$
- There is a solution that uses at most 2 colours

No, the answer is incorrect. Score: 0
Accepted Answers: 
- There are exactly 3 solutions
- There is no solution where $D$ is $g$
11) What is true about the diagram shown below.

☐ It is the matching graph of the given CSP
☐ It is not a matching graph because links between X and Z are missing
☐ It depicts the constraints $R_{XY}$ and $R_{XZ}$
☐ None of the above

No, the answer is incorrect.
Score: 0
Accepted Answers:
It is the matching graph of the given CSP
It depicts the constraints $R_{XY}$ and $R_{XZ}$

12) Domain values may be pruned during ______

☐ Node consistency enforcement
☐ Arc consistency enforcement
☐ Path consistency enforcement
☐ i-Consistency enforcement
☐ All of the above

No, the answer is incorrect.
Score: 0
Accepted Answers:
Node consistency enforcement
Arc consistency enforcement

13) After making X arc-consistent with respect to Y ______

☐ $R_{XY}$ remains the same
☐ New tuples are added to $R_{XY}$
☐ Some tuples are removed from $R_{XY}$
☐ The value b is deleted from $D_X$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$R_{XY}$ remains the same
The value b is deleted from $D_X$

14) After making X and Y arc-consistent with respect to each other ______

☐ $R_{XY}$ remains the same
☐ New tuples are added to $R_{XY}$
☐ Some tuples are removed from $R_{XY}$
☐ The value a is deleted from $D_Y$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$R_{XY}$ remains the same
The value a is deleted from $D_Y$

15) If a constraint network is arc consistent then ______

☐ Every assignment to any variable can be extended to any other variable
☐ Every assignment to any two variables can be extended to any third variable
☐ A solution always exists
☐ A solution always exists if no domain is empty

No, the answer is incorrect.
Score: 0
Accepted Answers:
Every assignment to any variable can be extended to any other variable

16) If a constraint network is arc consistent then ______

☐ Search is always backtrack free
☐ Search could be backtrack free for some instances
☐ Search is backtrack free if the network is a tree structure
☐ None of the above

No, the answer is incorrect.
Score: 0
17) If a constraint network is path consistent then ______

- Every assignment to any variable can be extended to any other variable
- Every assignment to any two variables can be extended to any third variable
- A solution always exists
- A solution always exists if no domain is empty

No, the answer is incorrect.

Score: 0

Accepted Answers:
Every assignment to any two variables can be extended to any third variable