Started on	Wednesday, 9 June 2021, 1:04 PM
State	Finished
Completed on	Wednesday, 9 June 2021, 1:59 PM
Time taken	55 mins 2 secs

Question 1

Complete

Marked out of 0.50

If p is False, q is True and r is False, what is the truth value of ((~p ^q) V (q ^ r)) → r.

Select one:

- True
- False

Question 2

Complete

Marked out of 0.50

The following inference is a fallacy:

If the client is guilty, then he was at the scene of the crime. The client was at the scene of the crime. Hence the client is not guilty.

Select one:

- True
- False

Question 3

Complete

Marked out of 0.50

Let A, B and C be subsets of some universal set U.

Given that $A \cap B = A \cap C$ *and* $A^c \cap B = A^c \cap C$, does it follow that B=C ?

Select one:

- True
- False

Question 4

Complete

Marked out of 0.50

(Type only the name of the rule in small case. No need to mention rule after the name. Do not make spelling mistake)

Identify the rule of inference:
"It is below freezing and raining now. Therefore, it is below freezing now".
The rule of inference used is----------

Answer: simplification

Question 5

Complete

Marked out of 1.00

Negation of the below statement is:
"If it rains today then some children do not come to park" is:

a) It does not rain today, and all children come to park.
b) It does not rain today, and some children come to park.
c) It rains today and all children come to park.
d) It rains today and some children come to park.

Select one:

- a. Option a
- b. Option b
- c. Option c
- d. Option d

Question 6

Complete

Marked out of 1.00

Verify which of the following set/sets are null sets:

Select one or more:

- [ ] a. $D = \{x: x \text{ is an even prime number}\}$
- [ ] b. $A = \{x: x < 1 \text{ and } x > 3\}$
- [ ] c. $C = \{x: x^2 - 1 = 0, x \in R\}$
- [x] d. $B = \{x: x^2 = 9 \text{ and } 3x = 7\}$

Question 7

Complete

Marked out of 0.50

Given that A U B = A U C, is it necessary that B=C?

Select one:

- (•) True
- ( ) False

Question 8

Complete

Marked out of 1.00

Indicate which of the following well-formed formula are valid:

a) (P → Q) ^ (~Q) → ~P

b) (P → Q) →(~P→~Q)

c) (P ^ (~P V ~ Q) →Q)

d) ((P→R) V (Q→R)) → ((P V Q)) →R)

Select one:

- ( ) a. Option d
- (•) b. Option a
- ( ) c. Option b
- ( ) d. Option c

Question 9

Complete

Marked out of 1.00

Let $A = \{1, 2, 3\}, B = \{a, b\}$ and $C = \{r, s\}$ and $f: A \to B$ be defined by $f(1) = a, f(2) = a, f(3) = b$ and $g: B \to C$ be defined by $g(a) = s, g(b) = r$. Compute $gof(2)$ and $gof(3)$.

Note: Only state the output values separated by , and without any spaces for each function composition in the above-mentioned order like 5,-3.

Answer: s,r

Question 10

Complete

Marked out of 1.00

An island has two tribes of natives. Any native from the first tribe always tells the truth, while any native from the other tribe always lies. We arrive at the island and ask a native if there is gold on the island. He answers, "There is gold on the island if and only if I always tell the truth". Which tribe is he from? Is there gold on the island?

a) First tribe, yes
b) Second tribe, yes
c) Cannot be determined, yes.
d) Second tribe, no.

Select one:

- a. Option D
- b. Option B
- c. Option C
- d. Option A

Question 11

Complete

Marked out of 1.00

"If you do every problem in this book, then you will learn discrete mathematics. You learned discrete mathematics. Therefore, you did every problem in this book."

The above argument is invalid. This type of incorrect reasoning is called:

a) Fallacy of affirming the conclusion.
b) Fallacy of denying the hypothesis.
c) Fallacy of denying the conclusion.
d) Fallacy of affirming the hypothesis.

Select one:

- a. Option d
- b. Option a
- c. Option b
- d. Option c

Question 12

Complete

Marked out of

1.00

Let R be the relation represented by the matrix

$$M_R = \begin{bmatrix} 0 & 1 & 1 \\ 1 & 0 & 1 \\ 1 & 1 & 0 \end{bmatrix}$$

Determine (i) the number of 0's third row and (ii) the number of 0's in the third column of the matrix $M_{R^{-1}}$.

Note: Only state the output values separated by , and without any spaces for each case in the above-mentioned order like 5,-3.

Answer: 0,0

Question 13

Complete

Marked out of

0.50

The given operations in orders of precedence are:

(Highest precedence operator should be written first)

a) →, ~, ^, V

b) →, ^, V, ~

c) ~, ^, V, →

d) ~, V, ^, →

Select one:

- a. Option b
- b. Option c
- c. Option a
- d. Option d

Question 14

Complete

Marked out of

1.00

A function f: N→ N, where N is the set of natural numbers including 0.
Comment on the type of the following functions (**one-one, onto, none, both**)

1) $F(j)=j^2+2$
2) F(j)=1; if j is odd
   =0; if j is even

[Note: write the answer for each part separated by commas and without any space. One Example answer is: both,one-one]

Answer: both,none

Question 15

Complete

Marked out of 1.00

Let A and B be two fuzzy sets defined as:

A = {(a, 0.3), (b, 0.4), (c, 0.5)}

B = {(a, 0.2), (b, 0.6), (c, 0.7)}

Compute the set difference A – B which in fuzzy sets is defined as $A - B = A \cap B^C$.

Note: Enter the elements in the set form separated by , and without any spaces. The ordered pairs should be stated alphabetically like {(p,0.2),(q,0.5),(r,1)}.

Answer: {(a,0.3),(b,0.4),(c,0.3)}

Question 16

Complete

Marked out of 1.00

Let U = {1, 2, 3, 4, 5, 6, 7}. Find the set represented by the bit string 0011001 where 0 represents that the element at this position is not present and 1 represents that the element at this position is present in the resultant set.

Note: Enter the set elements using set representation notation with elements separated by a , and without any spaces like {a,b,c}.

Answer: {3,4,7}

Question 17

Complete

Marked out of 1.00

Which one of the following is not equivalent to $p \leftrightarrow q$?

A. $(\sim p\ V\ q)\ \wedge\ (p\ V\ \sim q)$

B. $(\sim p\ V\ q)\ \wedge\ (q -> p)$

C. $(\sim p\ \wedge\ q)\ V\ (p\ \wedge \sim q)$

D. $(\sim p\ \wedge \sim\ q)\ V\ (p \wedge q)$

Select one:

- a. Option A
- b. Option B
- c. Option D
- d. Option C

Question 18

Complete

Marked out of 0.50

The number of elements in the power set of A= {{a, b}, {c}, {d, e, f}} is ----------

[Note: write the answer as direct numeric value only for example 15]

Answer: 64

Question 19

Complete

Marked out of 1.00

Find whether the following argument is consistent:

p → q, p- > r, q→ ~r, p

a) Consistent

b) Inconsistent

Select one:

- a. Option A
- b. Option B

Question 20

Not answered

Marked out of 1.00

Let R = {(1,2), (2,3), (3,1)} be defined on the set A = {1, 2, 3}. Calculate the symmetric closure of R.

Note: Enter the ordered pairs using the set representation without any spaces between the ordered pairs like {(a,b),(c,d)}. Also, please make sure that the ordered pairs are stated in ascending order considering the x element first followed by the y element in the ordered pair (x,y) like {(1,1),(5,2),(5,5)}.

Answer:

Question 21

Complete

Marked out of 1.00

Suppose X and Y are sets and |X| and |Y| are their respective cardinality. It is given that there are exactly 101 functions from X to Y. From this one can conclude that

A. |X|=1,|Y|=101
B. |X|=101,|Y|=1
C. |X|=101,|Y|=101
D. None of the above

Select one:

- a. Option C
- b. Option A
- c. Option D
- d. Option B

Question 22

Complete

Marked out of 0.50

(a->b)->(b->c) represents a tautology.

Select one:

- True
- False

Question 23

Complete

Marked out of 0.50

State the two types of quantifies.

Note: Enter only the words in small case without any prefix or suffix, separated by a , and no spaces. The words should be stated in alphabetical order without any spelling mistakes.

Answer: universal,existential

Question 24

Not answered

Marked out of 1.00

Let A = {2, 3, 5}, B = {6, 8, 10} and R be a relation defined from A to B such that:

$$(x, y) \in R \text{ if } x \text{ divides } y$$

Compute the (i) Dom (R^{-1}) and (ii) Ran (R).

Note: State the elements of part (i) followed by part (ii) using sets representation separated by a , and without any spaces. Also, inside the set the elements should be entered in the ascending order like {12,13,14},{1,2}.

Answer:

Question 25

Complete

Marked out of 0.50

The following logical form represents a tautology:

$$(q \rightarrow p) \rightarrow p$$

Select one:

- True
- False