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Program= Software Engineering

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Question No(1)

Answer (a)

Biconditional Statement

A biconditional statement is a single true statement that combines a true conditional with its converse

Conditional Statement

If hypothesis, then conclusion

Converse Statement

If conclusion, then hypothesis

So if both the conditional & its converse are true, They can be combined into a Bioconditional Statement "Hypothesis if & only if conclusion".

They can be denoted by double headed arrow like ($\leftrightarrow$)

The biconditional $P \leftrightarrow$ represented "P" if & only if "q" where "P" is a hypothesis & q is a conclusion

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Now the following is truth table for ~~bio~~ biconditional $P \leftrightarrow q$

P	q	$P \leftrightarrow q$
T	T	F
T	T	F
T	F	F
T	F	T
F	T	T
F	T	T
F	F	T
F	F	F

Part (b)

i) Sam had Pizza last night and Chris finished her ~~hom~~ homework $P \wedge q$

ii) Pat watched the news this morning iff Sam did not have Pizz last Night
$r \Leftrightarrow \neg P$

iii) $r \Leftrightarrow (q \cap \neg P)$

iv) $r \Leftrightarrow (P \wedge q)$

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Question No(2)

Answer

Let Suppose

(i) P = It is hot today

q = It is Sunny

r = It is raining

i) It is ~~Sun~~ Sunny if and only if it is hot tody

ii) It is hot tody iff it is Sunny & it is raining

iii) It is hot today iff it is Sunny or it is raining

iv) It is raining iff it is hot today or it is Sunny.

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Question No(3)

Answer

Argument: In logic & Philosophy, an argument is a Series of Statements (in a natural language), Called the premises or premisses (both spellings are acceptable) intended to determine the degree of truth of another Statement, the Conclusion

"OR"

~~Mathemam~~

Mathematically argument ⇒

A Mathematically argument is a sequence of Statement & reasons given with the aim of demonstrating that a claim is true or false

Example ⇒ If it is cloudy outside, then it will rain.

⇒ "It is ~~not~~ cloudy outside"

a Conclusion might be

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"It will rain" Intuitively, This seems valid

An argument is considered valid if from the truth of all Premises, the conclusion is & must also be true.

Example of valid argument form.

Premises ⇒ $P \vee (q \vee r)$ & $\sim r$,
conclusion = $P \vee q$

Example of invalid argument

Premises ⇒ $P \vee q \vee \sim r$ & $q \vee P \wedge r$,
Conclusion $(P \vee q r)$.

Differentiate valid & invalid argument

⇒ Argument is valid if the conclusion is true when all the premisses are true or if conjunction of its premises imply conclusion $P_1 \wedge P_2 \wedge P_3 \wedge \dots \wedge P_n \to C$ is a tautology.

Argument is invalid if the conclusion is false

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when all the Premises are true or if conjunction of its premises does not imply conclusion.

$P_1 \wedge P_2 \wedge P_3 \cdots \wedge P_n \rightarrow C$ is a Contradiction.

~> False premises & a true conclusion
OR False premises & a false conclusion

~> Argument may either valid or invalid & Statement may true or false.

~> **Example =** (1) Anyone who lives in the city London, Hi also lives on the island of London.
Hi does not live on the island of ~~a~~ London.
Therefore, Hi does not lives in the city London (invalid)

2) All crows are black. only crows are black.
Abc is black
Abc is black

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Therefore, Abc is a crow (valid)

truth table ⇒

$P \rightarrow Q$: If my ~~com~~ laptop crashes, I will lose all my Photos.

~~$\sim Q$ = If Pg~~

$\sim Q$ = I have not lost all my Photos. ~~Con~~

~~$\sim P$~~ Conclusion ⇒

$\sim P$ ⇒ My laptop has not Crashed

Argument ⇒ $[(P \rightarrow Q) \wedge \sim Q] \rightarrow \sim P$

P	Q	$\sim P$	$\sim Q$	$P \rightarrow Q$	$[(P \rightarrow Q) \wedge \sim Q] \rightarrow \sim P$
T	T	F	F	T	T
T	F	F	T	F	T
F	T	T	F	T	T
F	F	T	T	T	T

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Question No(4)

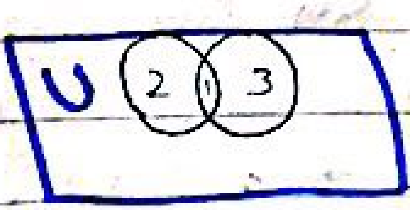
Answer

Part (A) Union : Two Set :

operations the union of two Sets is a set containing all elements that are in "A" or in "B" (Possibaly both).

Example ⇒ Let suppose $A=\{1,2\}$ & $B=\{2,3\}$ Now $A \cup B = \{1,2\} \cup \{2,3\} \Rightarrow \{1,2,3\}$ ~~the~~ Thus we can write $x \in (A \cup B)$ if & only if $(x \in A)$ or $(x \in B)$.

Union Represented by '$\cup$'



Truth table for Union

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A	B	A∪B
0	0	0
0	0	0
0	1	1
0	1	1
1	0	1
1	0	1
1	1	1
1	1	1

Part "B"

Intersection, The intersection of two sets is a new set that contains all of the elements that are common in both sets. The intersection is can be ~~write~~ written as $A \cap B$ or ~~A-e~~ A and B.
Intersection represented by "$\cap$"
In intersection only taken common element.
For example $A = \{1, 2, 3, 4\}$ $B = \{3, 4, 5, 6\}$
$A \cap B = \{3, 4\}$.

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Truth table For Intersection

p	q	$p \cap q$
T	T	T
T	F	F
F	T	F
F	F	F

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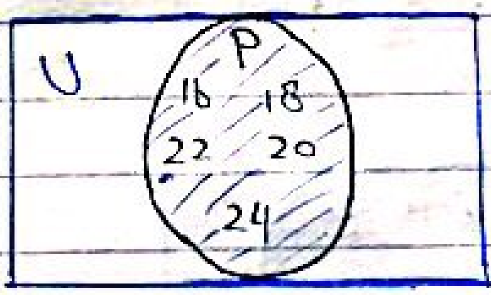
Question No(5)

Answer Part "B"

Solution(B) Let $P = \{16, 18, 20, 22, 24\}$

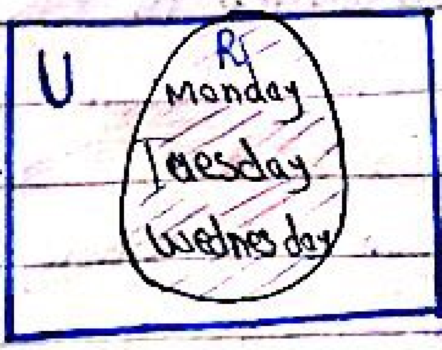
Now venn Diagram of Set "P"



Part(C) Solution

Let R_1 = { Monday, Tuesday, wednesday }

Venn Diagram



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Part(D) Solution

$2x - 3 < 11$

$\Rightarrow 2x < 11 + 3$

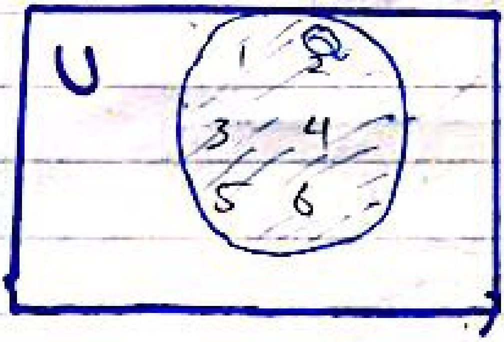
$2x < 14$ Now Divid both Sides by 2

$\frac{2x}{2} < \frac{14}{2}$

$\boxed{x < 7}$

So the Set is

$Q = \{1, 2, 3, 4, 5, 6\}$



Part (A)

Venn Diagram $\Rightarrow$ A venn diagram is an illustration that uses Circles to show the relationship among things. Circles that overlap have a commonalty while Circles

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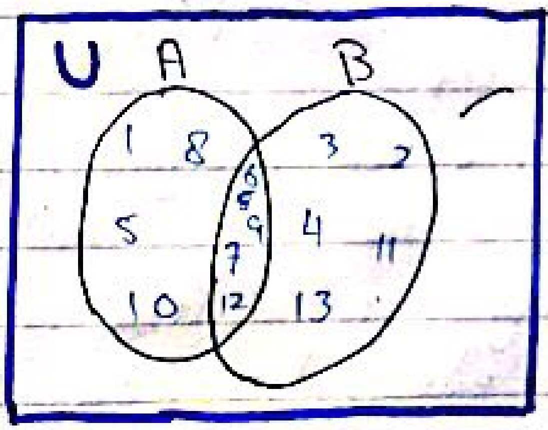
that do not overlap do not share those traits. Venn diagrams help to visually represent the similarities & differences b/w two concept. They have long been recognized for their usefulness as educational tools. Since the mid-20th century venn diagram have been used as part of the introductory logic curriculum & in elementary-level educational plans around the world.

Important:- Venn-Diagram have been used since the mid-20th century in classroom from the elementary school level to introductory logic

Application:- venn diagrams are used to depict how ~~used~~ items relate to each other aginist an overall backdrop, universe data set or environment.

Example = There are two sets, A = {1, 5, 6, 7, 8, 9, 10, 12} & B = {2, 3, 4, 6, 7, 9, 11, 12, 13}. The section where the two sets overlap has the numbers contained in both set A & B referred to as the intersection of A & B. The two sets put together, gives their union which comprises of all objects in A, B which are: {1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13}



U = a complete venn Diagram represents this.

The End