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Question No 1 part A , (A)

(a)

p= "Dataend flag is off"
q= "ERROR equals 0"
r= " Sum is less then 1,000"

we can then rewrite the given Sentence as;

"Dataendflag is off, and ERROR equals 0 and Sum is less than 1,000."

Replacing the Statements by p, q and r and replacing "and" by ∧ , we then obtain

$p \wedge (q \wedge r)$

Note:- Brackets are unnecessary to place. because the associative law tells us that $p \wedge (q \wedge r)$ is equivalent with $(p \wedge q) \wedge r$ and thus the Statement $p \wedge q \wedge r$ is unambiguous.

Question No 1 , part A, (B)

(b)

p= 'Dataendflag is off'
q= "ERROR is not equal to 0"

Note: we can used a word "but" in the given Sentence actually implies "and" thus can then rewrite the given sentence as"

"Dataendflag is OFF And ERROR is not equal to 0"

$\{p \wedge \neg q\}$

Brackets are unnecessary to place, because the associated law tell us that $(p \wedge \neg q)$ is equivalent with $p \wedge \neg q$ and thus the statement $p \wedge \neg q$ is unambiguous.

Question No 1, part A, (C)

Answer: (C)

P= "Dataendflag is OFF"
q= "Error equals is 0"
r= "Sum is less 1000"

we can then rewrite the given Sentence as;

"Dataendflag is OFF and ERROR is not equal 0 or Sum is not less then 1000."

Replacing the statements by p, q, and r
Replacing "and" by "$\wedge$" and replacing "not" by ~, we then obtain:

$(P \wedge \sim q) \vee \sim R$

Note; Brackets are unnecessary to place because the associated law tell us that $(P \wedge \sim q) \vee \sim R$ is equivalent with $p \wedge (q \vee \sim r)$ and thus the statement $p \wedge \sim q \vee \sim r$ is unambiguous.

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Question No 1 ,, (D)
Part (A) , D

d)

p = " DataendFlag is off"
q = " ERROR equals 0"
r = " Sum is less then 1.000"

Note: that the world "but" in the given Sentence actually implies "and", thus Can then rewrite the given sentence as:

" Dataendflag is not off and ERROR equals '0'; and Sum is not less then 1,000."

Replacing the Statements by p, q and r. replacing "and" by $\wedge$ and replacing "not" by $\sim$, we then obtain:

$$(\sim p \wedge q) \wedge \sim r$$

Note: Brackets are unnecessary to place, because the associated law tell us that $(\sim p \wedge q) \wedge \sim r$ is equivalent with $\sim p \wedge (q \wedge \sim r)$ and thus the statement $\sim p \wedge q \wedge \sim r$ is unambiguous.

Page (4)

Question 1 part A, (E)

e)

P = " Dataendflag is off "
q = " ERROR equals 0 "
r = " Sum is less then 1000 "

We can then rewrite the given statement as

" Dataendflag is ~~off~~ on or ERROR equals 0 and Sum is less then 1000."

Replacing the statements by p, q and r and replacind and in to " ∧ " and or changed in to ∨ "

$\sim p \vee q \wedge r$

Note: Brackets are unnecessary to place, because the associated law tell us $(\sim p \vee q) \wedge r$ is equivalent with $\sim p \vee (q \wedge r)$ is unambiguous.

$\longleftrightarrow$

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Question No 1, part B"

prove: $(p \vee q) \rightarrow r \equiv (p \rightarrow r) \wedge (q \rightarrow r)$

Solution:

$$(P \vee q) \Rightarrow r \equiv (P \rightarrow r) \wedge (q \rightarrow r)$$

Take R.H.S

$\vee$ = OR
$\wedge$ = And
$\neg$ = not

$= (P \rightarrow r) \wedge (q \rightarrow r)$

$= (P \vee \neg r) \wedge (q \vee \neg r) =$

-: $S = (P \vee q)$:-

$= \underbrace{(P \wedge q)}_{S} \vee \neg r$

$= S \vee \neg r$

$= S \rightarrow r$

$= (P \vee q) \rightarrow r$ So L.H.S Proof.

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Question No 2
part A.a

Answer:

Converse:

General:
a: p = "Howard can swim across the lake".
q = "Howard can swim to the island"

$p \to q$

Converse form:
$q \to p$

Converse: Howard can swim to the Island
Howard can swim across the lake.

Inverse:-
$\neg p \to \neg q$

Howard cannot swim to the Island
Howard cannot swim across the lake.

Contrapositive:
$\neg q \to \neg p \Rightarrow$ Howard cannot swim across the lake. Howard cannot swim to the Island

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⇒ Question 2 part A · b

Answer:

p = "Today is Easter"
q = "Tomorrow is Monday"

General: "If Today is Easter then Tommorrow is Monday" => $p \rightarrow q$

: Converse:

$q \rightarrow p$

Tomorrow is Monday. Today is Easter.

: Inverse:

$\neg p \rightarrow \neg q$

Today isn't Easter. Tomorrow isn't Monday.

: Contrapositive:

$\neg q \rightarrow \neg p$

Tomorrow isn't Monday. Today isn't Easter.

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Question No 2
part b.1(b)

Truth table;

Prem Prem Prem

	p	q	r	$\sim r$	$p \vee \sim q$	$p \wedge q \to \sim r$	$p \vee \sim q$	$\sim q \to p$	s
2	T	T	T	F	T	T	T	F	T
3	T	T	F	F	T	T	T	F	F
4	T	F	T	T	T	T	T	T	T
5	T	F	F	T	T	F	T	T	F
6	F	T	T	F	F	T	F	T	T
7	F	T	F	F	F	T	F	T	F
8	F	F	T	T	T	T	T	T	T
9	F	F	F	T	T	T	T	T	F

Premises

Question No 2 part A 1(a)

Truth table;

p	q	r	$p \to q$	$\sim q \vee r$
T	T	T	T	T
T	T	F	T	F
T	F	T	F	T
T	F	F	F	T
F	T	T	T	T
F	T	F	T	F
F	F	T	T	T
F	F	F	T	T

Premises

Question No : 3

Solution:

Let

p = " This house is next to a lake"
q = " the treasure is in the kitchen"
r = " The Tree in the front yard is an elm"
s = " The Treasure is buried under the flagpole
t = " The tree in the back yard is an Oak
u = " the treasure is in the garage"

we Can then translate the five given Sentences as

(a) $p \to \sim q$
(b) $r \to q$
(c) p
(d) $r \vee s$
(e) $t \to u$

Now we will assume that the the previous four premises are true and derive a conclusion using rules of inference

	Steps	Reasons
1	$p \to \sim q$	Premise
2	$r \to q$	premise
3	p	premise
4	$r \vee s$	premise
5	$t \to u$	premise
6	$\sim q$	Modus ponens of (1) and (3)
7	$\sim r$	Modus tollens of (2) and (6)
8	s	Elimination of (4) and (7)

we have then derived in Step (8) that 's' is true and thus treasure is buried under the flagpole.

$\longleftrightarrow$ {Finish}

Finish

My

Paper

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