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QNo.1

(a): DATAEDDFLAG is off but ERROR is ~~not is~~ equal 0.

Ans:

$P \wedge q \vee \wedge \gamma$

(b): DATAENDFLAG is off but ERROR is not equal to 0.

Ans: $P \wedge \neg q \vee$

(C): DATAENDFLAG is off; however, ERROR is not 0 or SUM is greater than or equal to 1,000.

Ans: $P \wedge (\neg q \vee \neg \gamma)$

(d): DATAENDFLAG is on and ERROR equal 0 but sum is greater then or equal to 1,000.

Ans: $\neg P \wedge (q \vee \wedge \neg \gamma)$

(e): Either DATAENDFLAG is on or it is the case that both ERROR

equal 1,000 A

T	T	T
T	F	T
T	F	F
F	T	T
F	T	F
F	F	F

equal 0 and SUM is less then 1,000.

(e) Ans: $\neg P \vee (Q \wedge R)$

(B) Show that $P \vee Q \rightarrow R \equiv (P \rightarrow R) \wedge (Q \rightarrow R)$

P	Q	R	$P \vee Q$	$P \vee Q \rightarrow R$	$P \rightarrow R$	$Q \rightarrow R$	$(P \rightarrow R) \wedge (Q \rightarrow R)$
T	T	T	T	T	T	T	T
T	T	F	T	F	F	F	F
T	F	T	T	T	T	T	T
T	F	F	T	F	F	F	F
F	T	T	T	T	T	T	T
F	T	F	T	F	T	F	F
F	F	T	F	T	T	T	T
F	F	F	F	T	T	T	T

Q No. 2:

(a):

The Coverse:

If Howard can swim to the Island, then Howard can swim across

the lake.

$q \rightarrow p$

The Inverse:

IF Howard Cannat swim across the lake, then Howard connot swim to the Island.

The Contrapositive:

IF Howard cannot swim to the ~~across~~ Island, then Howard Cannot swim across the lake.

(b)

if today Easter, then tomorrow is Monday.

converse: if tomorrow is Monday, then today is Easter

Inverse: if today is not Easter, then tomorrow is not monday.

Contro positive: if tomorrow is not monday, then to day is not Easter.

(B)

(a)

p	q	*
T	T	T
T	T	F
T	F	T
T	F	F
F	T	T
F	T	F
F	F	
F	F	

(b).

p	
T	
T	
T	
T	
F	
F	
F	

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(B)

(a)

p
$p \to q$
$\neg q \vee r$
$\therefore r$

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

(b). $p \wedge q \to \neg r$
$p \vee \neg q$
$\neg q \to p$
$\therefore \neg r$

p	q	r	$\neg r$	$\neg q$	$p \wedge q$	$p \wedge q \to \neg r$	$p \vee \neg q$	$\neg q \to p$	$\neg r$
T	T	T	F	F	T	F	T	T	F
T	T	F	T	F	T	T	T	T	T
T	F	T	F	T	F	T	T	T	F
T	F	F	T	T	F	T	T	T	T
F	T	T	F	F	F	T	F	T	F
F	T	F	T	F	F	T	T	T	T
F	F	T	F	T	F	T	T	F	F
F	F	F	T	T	F	T	T	F	F

Q No. 3

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 garge

we can translate the five sentence.

(a) $p \rightarrow \neg q$

(b) $r \rightarrow q$

(c) p

(d) $r \vee s$

(e) $t \rightarrow v$

Now we will assume that the previous five premises are true;

And

(1)

(2)

(3)

(4)

(5)

(6)

(7)

(8)

7

And derive a conclusion using rule of ~~Int~~ Inference.

	Step	Reason
(1)	$p \rightarrow \neg q$	Premise
(2)	$r \rightarrow p$	Premise
(3)	p	Premise
(4)	$r \vee s$	premise
(5)	$t \rightarrow x$	Premise
(6)	$\neg q$	modus ponens of (1) and (3)
(7)	$\neg r$	modus tollens of (2) and (6)
(8)	s	

we have the derived in step (8) that "s" is true and thus the treasure is buried under is flag pole.

Result: The treasure is buried under the flagpole.