

FAHAM
AKHTAR

I-D NO \rightarrow 15772

Department \rightarrow BS (CS)

SAIFULLAH JAN

DISCRETE

16/04/2020

Let p be the statement
(8:00-11:00 am) is off, " q " the statement

"FLAG is 0," and r the statement
less than 1000". Express the following
in symbolic notation.

FLAG is off but ERROR is ~~not~~ equal
zero, and Sum is less than 1,000.

Solution

P = Data ending is off

q = Error equal zero

r = Sum is less than 1,000

$\vee \Rightarrow$ Or

$\wedge \Rightarrow$ and

\sim not

So, Answer = $P \vee (q \wedge r)$

DISCRETE

16/04/2020

Question No 1

Let p be the statement "DATAENDFLAG is off," q the statement "ERROR equal 0," and r the statement "Sum" is less than 1,000. Express the following sentences in symbolic notation.

(2) DATAEND FLAG is off but ERROR is ~~not~~ equal to zero, and Sum is less than 1,000.

Solution

p = Data ending is off

q = Error equal zero

r = Sum is less than 1,000

$\vee \Rightarrow$ Or

$\wedge \Rightarrow$ and

\sim not

So, Answer = $p \vee (q \wedge r)$

(b) DATAENDFLAG is OFF But ERROR is not equal to zero.

Answer $\boxed{p \wedge \sim q}$

(c) DATAENDFLAG is OFF, however ERROR is not 0 or sum is greater than or equal to 1,000.

Answer $\boxed{p \wedge (\sim q \vee r)}$

(d) DATAENDFLAG is ON and ERROR equal to 0 but sum greater than or equal to 1,000.

Answer ~~$\boxed{p \wedge (\sim q \vee r)}$~~ $\boxed{\sim p \wedge (q \wedge \sim r)}$

(e) Either DATAENDFLAG is ON or it is the case that both Error equal zero and sum is less than 1000.

Answer $\boxed{\sim p \vee (q \wedge r)}$

Date _____

Question No 1(b) Show That $p \vee q \rightarrow r$
 $= (p \rightarrow r) \wedge (q \rightarrow r)$

Solution

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

As in Column 5 and 8, All Values are Same, So Hence proved that $p \vee q \rightarrow r$

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

L.H.S = R.H.S Answer

Date: _____

Question No 2(A) Write the converse, inverse and Contrapositive of the following

(a) If Howard can swim across lake, then Howard can swim to the island.

* Converse → If Howard can swim to the island then Howard can swim across lake.

* Inverse → If Howard can swim across lake, then Howard cannot swim to island.

* Contrapositive
If Howard cannot swim to the island, then Howard cannot swim across lake.

(b) If today is 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.

* Contrapositive → If tomorrow is not Monday then today is not Easter.

Question No 2(B)

which column represent premises
and which represent conclusions?

a: P
 $P \rightarrow q$
 $\sim q \vee r$
 $\therefore r$

				premises	\wedge	\wedge	conclusions
P	q	r	$\supset q$	P	$P \rightarrow q$	$\supset q \vee r$	r
T	T	T	T	T	T	T	T
T	T	F	T	T	T	F	F
T	F	T	T	T	F	T	T
T	F	F	T	T	F	T	F
F	T	T	F	F	T	T	T
F	T	F	F	F	T	F	F
F	F	T	T	F	T	T	T
F	F	F	T	F	T	T	F

Answer. 1st row is only row in which
all premises are True and conclusion
are also true

There is no other row where Both
are True So, this Argument
are valid.

(b)

$$\begin{array}{l} P \wedge q \rightarrow r \\ P \vee \sim q \\ \sim q \rightarrow P \\ \therefore \sim r \end{array}$$

P	q	r	$\sim q$	$\sim r$	$P \wedge q$	$P \wedge q \rightarrow \sim r$	$P \vee \sim q$	$\sim q \rightarrow P$	$\sim r$
T	T	T	F	F	T	F	T	T	F
T	T	F	F	T	T	T	T	T	T
T	F	T	T	F	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	F	T	F	T	F	T	T
F	F	T	T	F	F	T	T	F	F
F	F	F	T	T	F	T	T	F	T

Solution In 3rd row All premises are True But conclusion are false so this Argument are "Invalid"

Question No 3

Date: _____

Solution let $p =$ House is next to a lake
 $q =$ The treasure is in kitchen
 $r =$ The tree in front yard is an elm
 $s =$ Treasure is buried under flagpole
 $t =$ The tree in backyard is an oak
 $u =$ The treasure is in grape

- (a) $p \rightarrow \neg q$ (b) $r \rightarrow q$ (c) p
(d) $r \vee s$ (e) $t \rightarrow u$

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

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