

Reg #: FA21-BSE-133

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Name: AOUN-HAIDER

Course Title: Discrete Structures

Section: A

Assignment#: 01

Submitted to: Mahwish-Waqas

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Q No:-01

Show that compound propositions are tautology or not.

$$a) \neg(q \rightarrow \neg p) \rightarrow \neg q$$

$$\equiv \neg(\neg q \vee \neg p) \rightarrow \neg q$$

(Implication law)

$$\equiv \neg\neg(\neg q \vee \neg p) \vee \neg q$$

Implication law

$$\equiv (\neg q \vee \neg p) \vee \neg q$$

Double-negation

$$\equiv (\neg q \vee \neg q) \vee \neg p$$

Associate law

$$\equiv \neg q \vee \neg p$$

Idempotent law

$$\equiv \neg p \vee \neg q$$

Commutative law

It's not a Tautology.

Ans

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(A)

$$b) (p \rightarrow q) \wedge (\neg q \rightarrow \neg p)$$

$$\equiv (\neg p \vee q) \wedge (\neg q \rightarrow \neg p)$$

Implication law

$$\equiv (\neg p \vee q) \wedge (\neg \neg q \rightarrow \neg p)$$

Implication law

$$\equiv (\neg p \vee q) \wedge (q \vee \neg p)$$

Double-negation

$$\equiv (\neg p \vee q) \wedge (\neg p \vee q)$$

Commutative law

$$\equiv \neg p \vee q$$

Idempotent law

It's not a tautology.

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Q No:-02

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(A) / \*

a)  $g$  will not go to the beach whenever it is not a sunny summer day.

$\therefore C \text{ whenever } H$

If it is not a sunny summer day,  $g$  will not go to beach.

$\neg P = g$  is not a sunny summer day

$\neg Q = g$  do not go to the beach.

① Converse  $Q \rightarrow P$

If  $g$  do not go to the beach, then it is not a sunny summer day.

② Inverse:  $\neg P \rightarrow \neg Q$

If it is a sunny summer day, then  $g$  will go to the beach.

③ Contrapositive:  $\neg Q \rightarrow \neg P$

If  $g$  go to the beach, then it is a sunny summer day.

b) The beach erodes if there is a storm.  
C if H

① Converse:  $Q \rightarrow P$

~~If there is a storm, then the beach erodes.~~

If the beach erodes, then there is a storm. Antida

② Inverse:  $[\neg p \rightarrow \neg q]$

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(A) / \*

If there is not a storm, then the beach does not erode.

③ Contrapositive  $(\neg q \rightarrow \neg p)$

If the beach does not erode, then there is not a storm.

Q No: - 03

Convert to "if p, then q" form.

a) The beach erodes whenever there is a storm.

if p, then q: C whenever H

If there is a storm, then the beach erodes.

b) It is necessary to have a valid password to log on to the server.

C necessary for H

P = You can log on to the server.

q = You have a valid password.

if p, then q:

If you can log on to the server, then you have a valid password.

Answer



c) The apple trees will bloom if it stays warm for a week.

"C if H"

$P$  = It stays warm for a week.

$Q$  = The apple trees will bloom.

if  $P$ , then  $Q$ :

If it stays warm for a week, then the apple trees will bloom.

d) You will reach the summit unless you begin your climb too late.

$C$  unless  $\neg H$

$\neg P$  = You do not begin your climb too late.

$Q$  = You will reach the summit.

if  $P$ , then  $Q$ :

If you do not begin your climb too late, then you will reach the summit.

←→  
The  
End

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