

Question No 6 :-

Use the laws of logical Propositions to Prove that. $(Z \wedge W) \vee (\neg Z \wedge W) \vee (Z \wedge \neg W) = Z \vee W$
State Carefully which law using each stage.

Answer:-

$$(Z \wedge W) \vee (\neg Z \wedge W) \vee (Z \wedge \neg W) = (Z \wedge W) \vee (Z \wedge \neg W) \vee (\neg Z \wedge W)$$

$$= (Z \wedge W) \vee (Z \wedge \neg W) \vee (\neg Z \wedge W) \text{ Commutative law}$$

$$= (Z \wedge (W \vee \neg W)) \vee (\neg Z \wedge W) \text{ Distributive law}$$

$$= (Z \wedge T) \vee (\neg Z \wedge W) \text{ Complement law}$$

$$= Z \vee (\neg Z \wedge W) \text{ Identity law}$$

$$= (Z \vee \neg Z) \wedge (Z \vee W) \text{ Distributive law}$$

$$= T \wedge (Z \vee W) \text{ Complement law}$$

$$= (Z \vee W) \wedge T \text{ Commutative law}$$

$$= Z \vee W \text{ Identity law.}$$

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d) $(P \wedge Q) \vee R$

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

Question No 5:-

Use
truth tables to show that
 $\neg((P \vee \neg Q) \vee (\neg(P \vee \neg Q))) = \neg P \wedge Q$

P	Q	$\neg Q$	$\neg(P \vee \neg Q)$	$\neg(P \vee \neg Q) \vee (\neg(P \vee \neg Q))$	$\neg P \wedge Q$
T	T	F	F	F	F
T	T	F	F	F	F
T	F	T	F	F	F
T	F	T	F	F	F
F	T	F	T	F	T
F	T	F	T	F	T
F	F	T	F	F	F
F	F	T	F	F	F

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Question No 1:-

the following are ^{in which of} Proposition?

- a) Buy Premium Bonds!
- b) The Apple Macintosh is a 16 bit computer.
- c) There is a largest even number
- d) Why are we here?
- e) $8 + 7 = 13$
- f) $a + b = 13$

Answer :-

* B and C
e and f

Question No 2:-

P is " $x < 50$ " if q is " $x > 40$ "
Write as simply as you can

- a) $\neg P$
- b) $\neg q$
- c) $P \wedge q$

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P	q	$\neg P \vee \neg q$
F	F	T
F	T	T
T	F	T
T	T	F

b) $q \wedge (\neg P \vee q)$

P	q	$q \wedge (\neg P \vee q)$
F	F	F
F	T	T
T	F	F
T	T	T

c) $P \wedge (q \vee r)$

P	q	r	$(q \vee r)$	$P \wedge (q \vee r)$
T	T	T	T	T
T	T	F	T	T
T	F	T	T	T
T	F	F	F	F
F	T	T	T	F
F	T	F	T	F

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Answer:-

* (b) "Every body dislike Maths."

(b) P is "The answer is either 2 or 3"

(a) "Neither 2 nor 3 is the answer."

(b) "The answer is not 2 or it is not 3"

(c) "The answer is not 2 and it is not 3."

Answer:- A and C

In Part A (b) is Proposition.

In Part B (A) and (c) both are Proposition

(C)

In Part C (C) is Proposition.

(c) "Someone is my class is short or fat."

Question No 4:-

Construct

truth table for.

(a) $\neg P \vee \neg q$

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- d) $P \wedge Q$
- e) $\neg P \wedge Q$
- f) $\neg P \wedge \neg Q$

Answer :-

- (a) $x \geq 50$
- (b) $x \leq 40$
- (c) $40 < x < 50$
- (d) $x \leq 50$ or $x > 40$
- (e) $x > 50$
- (f) $x \geq 50$ and $x < 40$

Question No 3:-

In each part of this question a Proposition P is defined. Which of the statements that follow the definition correspond to the Proposition $\neg P$

- a) P is "Some People like Maths"
- a) "Some People dislike Maths."
- b) "Every body dislikes Maths."
- c) "Every body likes Maths."