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BS - SE Section (A)

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Q1 Which of the following are Propositions?

- (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) $a + b = 13$

Ans • b and c
e and f

Q2 p is " $x < 50$ "; q is " $x > 40$ "

write as simply as you can

- a) $\neg p$
- b) $\neg q$
- c) $p \wedge q$
- d) $p \vee q$
- e) $\neg p \wedge q$
- f) $\neg p \vee q$

Answer: (a) $x \geq 50$

(b) $x \leq 40$

(c) $40 \leq x < 50$

(d) $x \leq 50$ or $x > 40$

(e) $x \geq 50$

(f) $x \geq 50$ and $x \leq 40$

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Q3 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) "Everybody dislikes Maths"
 - (c) "Every body Likes Maths"

Answer: (b) "Everybody 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: - 1 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 in my class is short or fat"

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Q 4

Construct truth table for
a) $\neg p \vee \neg q$

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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Q1) $(p \wedge q) \vee r$

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

Q2) Use truth tables to show that $\neg((p \vee \neg q) \wedge (r \wedge (p \vee \neg q))) \equiv \neg p \wedge q$

P	Q	$\neg q$	$\neg((p \vee \neg q) \wedge (r \wedge (p \vee \neg q)))$	$(r \wedge (p \vee \neg q))$	$\neg p \wedge q$
T	T	F	F	F	F
T	T	F	F	F	F
T	F	T	F	F	F
T	F	F	F	F	F
F	T	T	T	T	T
F	T	F	T	F	T
F	F	T	F	F	F
F	F	F	F	F	F

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Q.6
use the laws of logical propositions to
prove that

$(Z \wedge W) \vee (\neg Z \wedge W) \vee (Z \wedge \neg W) \equiv Z \vee W$
state completely which law using each
stage.

$$\begin{aligned}(Z \wedge W) \vee (\neg Z \wedge W) \vee (Z \wedge \neg W) &= (Z \wedge W) \vee (Z \wedge \neg W) \vee (\neg Z \wedge W) \\ &= (Z \wedge W) \vee (Z \wedge \neg W) \vee (\neg Z \wedge W) \quad \text{Commutative law} \\ &= (Z \wedge (W \vee \neg W)) \vee (\neg Z \wedge W) \quad \text{Distributive law} \\ &= (Z \wedge T) \vee (\neg Z \wedge W) \quad \text{Complement law} \\ &= Z \vee (\neg Z \wedge W) \quad \text{Identity law} \\ &= (Z \vee \neg Z) \wedge (Z \vee W) \quad \text{Distributive law} \\ &= T \wedge (Z \vee W) \quad \text{Complement law} \\ &= (Z \vee W) \wedge T \quad \text{Commutative law} \\ &= Z \vee W \quad \text{Identity law}\end{aligned}$$