

Hamid Khan

roll number 15730

S.E 2<sup>nd</sup> semester section A

Discrete structure.

## MCGS

Q1) There is a largest even number and  $8+7=13$

Q2) a)  $\neg p = x \geq 50$

b)  $\neg q = x \leq 40$

c)  $p \wedge q = 40 < x < 50$

d)  $p \vee q = x < 50$  and  $x > 40$ .

e)  $\neg p \wedge q = x \geq 50$

f)  $\neg p \wedge \neg q = x \geq 50$  and  $x \leq 40$ . cant be true

Q3) part a = everybody dislikes Maths.

part b = neither 2 nor 3 is the answer. and the answer is not 2 and it is not 3

part c = someone in my class is short or fat.

Q4) Construct truth tables.

a)  $\neg p \vee \neg q =$

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

$$b) q \wedge (\neg p \vee q) =$$

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

$$c) p \wedge (q \vee r) =$$

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

$$d) (p \wedge q) \vee r =$$

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

Q5) Use truth tables to show that:

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

ans) The result in each of these case are  
F, F, F, F, T, F, F, F

Q6) Use the laws of logical propositions to prove that:

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

$$\begin{aligned} \text{ans) } (Z \wedge W) \vee (\neg Z \wedge W) \vee (Z \wedge \neg W) &= (Z \wedge W) \vee (Z \wedge \neg W) \vee (\neg Z \wedge W) \\ &\quad \text{Commutative Law} \\ &= (Z \wedge (W \vee \neg W)) \vee (\neg Z \wedge W) \quad \text{Distributive} \\ &= (Z \wedge T) \vee (\neg Z \wedge W) \quad \text{complement Law} \\ &= Z \vee (\neg Z \wedge W) \quad \text{identity Law} \\ &= (Z \vee \neg Z) \wedge (Z \vee W) \quad \text{Distributive Law} \\ &= T \wedge (Z \vee W) \quad \text{complement Law} \\ &= (Z \vee W) \wedge T \quad \text{commutative Law} \\ &= Z \vee W \quad \text{identity Law} \end{aligned}$$