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Q1 Which of the following are propositions?

Ans

a) is not a proposition. (it is a command, or imperative.)

b) and (c) are both propositions.

d) is not a proposition; it's a question.

e) strictly speaking is a propositional function, but many people would say it is a proposition.

f) is not a proposition, because the result can be either true or false, it depends on the values a & and b.

Q.2 P is "$x < 50$"; q is "$x > 40$".

Ans

a) $x \geq 50$

b) $x \leq 40$

c) $40 < x < 50$

d) $x < 50$ or $x > 40$. This is true for all values of x.

Date:

e) $x \geq 50$ (note that we don't need to say, in addition, that $x \geq 40$; this must be true whenever $x \geq 50$.)

f) $x \geq 50$ and $x \leq 40$. This can never be true, whenever the value of x.

So (d) is a tautology – it's always true; and (f) is always false.

Q3 In each parts of this question..... ..... the proposition $\rightarrow p$? (There may be more than on answer).

Ans

A)

ii) "Everybody dislikes maths"

B)

i) "Neither 2 nor 3 is the answer"

iii) "The answer is not 2 and it is not 3"

C) ~~"Someone in my class is short or fat"~~

iii) "Someone in my class is short or fat"

Q4 Construct truth table for:

Date:

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

P	q	¬P	V	¬q
T	T	F	F	T
T	F	F	T	F
F	F	T	T	F
F	F	T	T	T
		(1)	(3) output	(2)

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

P	q	q ∧	¬P	∨q
T	T	T	F	T
T	F	F	F	F
F	T	T	T	T
F	F	F	T	T
		(3) output	(1)	(2)

Date:

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

P	q	x	$P \wedge$	$(q \vee x)$
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
			(2)	(1)
			output	

d) $(P \wedge q) \vee r$ Date:

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
			(1)	(2) output

Date:

05 Use truth tables to show that

$\neg((P \vee \neg q) \vee (r \wedge (P \vee \neg q))) \equiv \neg P \wedge q$

Ans

In each case, the result is

F, F, F, F, T, T, F

Date:

06 use the law of logical proposition to prove:

$(z \wedge w) \vee (\neg z w) \vee (z \wedge \neg w) \equiv z \vee w$

state carefully which law you are using.

Ans

$(z \wedge w) \vee (\neg z w) \vee (z \wedge \neg w) =$

$(z \wedge w) \vee (z \wedge \neg w) \vee (\neg z \wedge w)$
commutative law

$= (z \wedge (w \vee \neg w)) \vee (\neg z \wedge w)$
Distributive law

$= (z \wedge T) \vee (\neg z \wedge w)$ complement law

$= z \vee (\neg z \wedge w)$ identity law

$= (z \vee \neg z) \wedge (z \vee w)$ Distributive law

$= T \wedge (z \vee w)$ complement law

$= (z \vee w) \wedge T$ Commutative law

$= z \vee w$ identity law