"1"

* Model answer of CE 2 f1 "5th exam"

1) $(r \vee p) \wedge ((\sim r \vee (p \wedge q)) \wedge (r \vee q)) \equiv p \wedge q$

$(r \vee p) \wedge ((\sim r \vee p) \wedge (\sim r \vee q)) \wedge (r \vee q))$ → distributive law

$(r \vee p) \wedge ((\sim r \vee p) \wedge (q \vee \sim r) \wedge (q \vee r))$ → Commutative law

$(r \vee p) \wedge ((\sim r \vee p) \wedge (q \vee (r \wedge r^{\sim})))$ → distributive law

$r^{\sim}$ → Negation law

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

c → identity law

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

identity law → distributive law

$r \wedge \sim r$ → Negation law

$\equiv p \wedge q$

6

2

P	q	r	(r ∨ p)	~r	(r ∨ q)	(p ∧ q)	~r ∨ (p ∧ q)	(~r ∨ (p ∧ q)) ∧ (r ∨ q)
T	T	T	T	F	T	T	T	T
T	T	F	T	T	T	T	T	T
T	F	T	T	F	T	F	F	F
T	F	F	T	T	F	F	T	F
F	T	T	T	F	T	F	F	F
F	T	F	F	T	F	F	T	F
F	F	T	T	F	T	F	F	F
F	F	F	F	T	F	F	T	F

a)

(q ∧
T
T
F
F
F
F
F
F

#

2) a)

p	q	p → q	q → p	v
T	T	T	T	T
T	F	F	T	T
F	T	T	F	T
F	F	T	T	T

Toutology

p	q	p ∧ q	~(p ∧ q)	p ∨ ~(p ∧ q)	~
T	T	T	F	T	F
T	F	F	T	T	F
F	T	F	T	T	F
F	F	F	T	T	F

Contradiction

b)

4)

P	q	~P	~q	(~P ∨ q)	(~q ∨ P)	∧	P→q
T	T	F	F	T	T	T	T
T	F	F	T	F	T	F	F
F	T	T	F	T	F	F	T
F	F	T	T	T	T	T	T

4) a) negation: it's the weekend and the school is not closed

Converse: If school is closed, then it's the weekend

inverse: If it's not the weekend, then school is not closed

Contrapositive: If the school is not closed then its not the weekend

b) negation: an animal is a shark and it not lives in salt water

Converse: If it lives in salt water, then an animal is shark

inverse: If an animal is not shark, then it not lives in salt water

Contrapositive: if it not lives in salt water, then an animal is not shark

5)

P	q	P→q	q ∨ P	~q	~P	(~q) ∨ (~P)
T	T	T	T	F	F	F
T	F	F	T	T	F	
F	T	T	T	F	T	T
F	F	T	F	T	T	

not valid

$\forall x$. if x is honest People, then x Pay their Taxes

Let $H(x)$ → x is honest People.

$M(x) = x$ Pay their Taxes

Let "S" :- darth, so..

$\forall x$ If $H(s)$ then $M(s)$

$\sim M(s)$

$\therefore \sim H(s)$

→ S Valid by universal "Modus Tollens"

7) a) $\exists$ a real number x such that if $x^2 > 1$ doesn't has $x > 0$

b) $\forall$ integer x, If an integer x is divisible by 3, Then it is not even

8) a) For all real number x & all integers "a" & "b"

$a^2 = b^2 \rightarrow a = b$ universal truth

r, k Partical real number

$\therefore r^2 = k^2 \rightarrow r = k$

b) For all prime number $2^p - 1$ also prime — universal truth.

k :: Particular lab

$2^k - 1$ also Prime