	TUTORIAL #2 Page 1
	Propositional Logic and predicate logic
Q.7]	Express the contrapositive, converse, inverse and negation forms of the following
ton in	statements and activity think touchers it is all and a supplied the
	Il x il sational then oc is seal.
	Contrapositive: If x is not seal then. It
(* 5)	Converse: If x is seal then It is rational
	Invesse: If x is not rational, then x is
	not seal.
	Negation Form: P = 20 is rational number.
	2 = x is real number
	~P = oc is not sational number
	~9 = x is not seal numbes.
(;;)	If 36b and $1+1=2$, then $\sin x = 1$
>	Contrapositive: Il sin # + 1, then, 3¢ b 08
	17+1 # 2
	7 7 7 7 7 7
	Converse: If sin 1 = 1 , then 366 & 1+1=2
	Toverse: If 34h or 1+1+2, then sin 1-1

	Det.	A TAR	9 101	Page 2						
	Negation form: $\sim P = 3 < b $ or $1 + 1 \neq 2$ $\sim 9 = 5 $ or $1 \neq 1$ $= 2 + 2$									
	5 -2540/	The second secon								
Q.2	Construct truth table for the following questions to find if each of the following is a tautology, contradicition									
(î)	or conting	08 contingency: (P > (9-80)) -> ((P-89) -> (P-80))								
0.70	p q 8 9	38 P39	Por	(P29) -> (P20)	P3(938)					
<u>A 3B</u>	T T T T		7	Ž						
T	T T T	F	T	Time						
T	TFTF	T	F	F	<u> </u>					
T	T F F T	<u> </u>	F	T						
25	FTTT	T	7	T	7					
5	FTFT	T	7	7						
	FFTF	7	7							
7	FFFF	1	1 36	200						
	alone	0 7	1							
=>	Hence, this	e la	maros	19.	a = (= e)					
	(P-39) (-	> (~ D) va 1		10 ne - 1/2						
(;;;)	(P-37)	(L-1)·L)	4 1"		- 1 e - 1					
- 30 - 13E	P 9 P39	1 (mp) (mp	v9) (F	2-39) 4-> (~1	p) V 9					
	T T F T									
	TFF	FF		7						
	FF	T T	> 1	r Thasa	0.0					
Jan Barrier	= = -	ナ		7						
	,									
3	Hence gir	ren wff	فد	Tautology	7 1 100 00 000					
2	Hence you	1								
				The second secon						

									and the same of the same of	No. of Concession, Name of Street, or other Designation, or other
(;;)	Co	((P>9) ((9>8)) -3(P>8)								
				A		B	7	7.	7	9)
	P	9	8	P39	930	PAT	= A	A-s	B	
	T	7	T	T	7	7	1 1	-17		H
	Т	7	F	7 = 7	7	7	97	of T		
	7	E	T	7 7	F	(F	F	7	7	η
	T	F	F	T F	7	T	F	T	23	197
	F	T	7	7 7	7	7	Т	T		
	F	7	F	77	7	7	T	T	-1 -	51
	F	F	7	7	F	T	F	T		
<u> </u>	F	F	F	S Tark	T	7	T	Т		
			•	·				-		

> This WFF is Tautology

- (iv) (PAQ) A (~ (PVQ)) = (94 F) (P2Q) = F

				6)			
	P	2	PAQ	pvq	(~Bvg))	(PAQ)A (~(PKQ))	
	15	-	(~T~)	ATGE	20 F - 0	report por	
	7	F	F	T	FT	F T	_
	Ţ	7	F	77	F	Figure	_
	F	F	FT	P	+ , T 7	F	_
4				-			

=> This given WFF is contradition

9.3 Prove the following:

(°) (P-> (9->8)) = ((P-39)-> (P-38))

=> Hese, (P->(9->0)) = A

((p39)3(p38))=B

	ρ	9	8	9-38	Paq	Por	1	A	B	ez. a		
	T	T	7	7	7	T		T	7			
	+	7	F	7	AF -	T		To	7			
	7		<i>Г</i>	7 E	7	7 F 7		F	F	+	7	
	7		F	7	F	F F	-	T ====	T	7		
	F		7	7	T	T =	1 7	1	T	7	-	
	F		F	T	T		7	- 1	T	1 , 4		
	F	F .	Γ	F	Т	T	7	-	T	7'		
	F	F	 	T	+	Т	7		T	7	-1	
-				7	=1	16	个		Î	7 11 7	. =(
-				·y-	-	T	L. F	tos "	R.H	-5	71	
-				-		4						
=>	T	~	-4	unctio	on's a	e eq	ugs	rale	nt	-	7	
-	-											
	P	<->°	7 E	(P-39) ^ (q -> P) = [~	PV	₹)^	(~9	UP)	D.	(*)
	3:3	[] == ¹	A	211	1 11 6/12)	PA		P		
	P	9		P (-> 9_	(p -> 9)					Lagr	P)	
	T	T	+	T			T -	<u> </u>			7	<u>T</u>
	T	F	+	F	F 1	F	F			F		F
-	F	T	+	F	<u> </u>	+	T	7		٢		<u>F</u>
-		F		<u>^</u>	,	;	^	, ,				<u> </u>
	-				<u>, , , , , , , , , , , , , , , , , , , </u>		(2)		1		<u> </u>	3
	-				0	1.1		+1			3	
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					4, 5	(1,5)	ω)	A. C	-			2-
		-		51	e (Car	200	Pic	0)	7 .			
2							1					
	1											

Date: (:0:) Distributive law. (i) Pr(dvs) = (brd)v(brs) 8 B A 918 P v9 PVZ P 9 8 T T T T T T T T T T F T T F T T T F T 7 T T F T F T 7 T F F T 7 T T T T 1= T T F F F T T F F F F F F F F T T 产 F F F F F F 1 R.H.S L-H-5 (90) PA(qux) = (PAQ) V(PAX) A PAT A B 900 PAG P 9 0 T T T T T F F T 7 7 T T F T T T F F F F T T F T F F T F T T F F F F F F T R. 4.5 LoHa5 Hence, proved Distributive

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	,					Date	:					
(°V)	Abs	Absorption Laws										
	(1)		(P19)			, , , , , , , , , , , , , , , , , , ,	· -	THE STATE OF THE S				
	P 9 PA9 PV(PA9)											
va.	T	-	Т	Τ	- 5	V.						
<u> </u>	7	F	F	V		-						
-	F	٢	E	F		7						
	F	F	F	F								
	2			Ų								
	R-14.	S		L.H.S								
	 		:									
	(17)	.P '	(Pvq)	=P		T						
-	P	9	pvq	P1(P49)	<u></u>	<u> </u>	x 1 x 2					
	T	7	T	T			. ~					
	T	F	T	Т								
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	F	F	F	F			100					
	J			<u> </u>			· v	•				
	R. H .	5		L. H. S			- , +	· ,				
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<i>=</i> >	Ps	ove	1 Abso	aption La	uv	· ·	·	· · · · · · · · · · · · · · · · · · ·				
0,7				P-110-000	-							
4.6	06	Obtain as fallows:										
.0		all a single of the part of the same										
) O E	Obtain conjuctive normal form of ~(pvq)X->(prq)										
	b	by veing laws.										
	, ,	P <-	-> 9. =	[(~p~q)	1 (~qv	PJJ						
))v(p^q)]			(pvg)	7				
				(P^Q)]^								
	à						,					
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, i'	-0.4						Date		7
- 1	= [3	CPV	(型) ^	CPVq)3 ~ 5	(2VP) ^ (9	(P)	77	
¥.	11.		1						
		[3	(~P~	~P)	1 (~PV	~9)} * {(~	2~~	P)^(~9 ~~ 9)}]
	= 1	8P1C	Pv9)	} \ \{ \{ \} \	CQUP)1	23] ^[{~	01/~	PVng	2)3
						V.	5(~9 v	(~p)/	(~9)}
:	7.0							-	^
	= (P (2)	^ C-	·Pv~	19)	(Absorp	tion		w')
					-		ř ·	· /	
	= (CNF							
(P = 1	F 9	. 1	100	10			<u>, , , , , , , , , , , , , , , , , , , </u>		
<u> </u>	(P.	a 19	NSUL VSUL	1CAID-	<u> </u>	nal form	<u>0+</u>	7	1 , ,
	me:	thod.	<u> </u>	· ((opr	7 CH PH	~8)) by	thu	2 h	table
		71003						-	
	(P ->	· (21.	8)) ((~P	>(~P	1~8))			
		J				<i>J J</i>		- , +,	
	ļ.,		1	, .					
	PC	1 8	~P	~8	918	(~P^~z)	A.	B	A^B
	T	T	F	F	1	 	T	7	T
	7	FF	F	T	F	F	. F	T	F
	TF		F	F	F	F	F	T	F
	TF	F	F	Ţ	F	F	F	T	F
	FT	7	T	F	T	F		F	F
	FT	F	T	Σ	F	F	T	F	<u> </u>
	F F F F	 =	7	F	F	7	+	T	7
	<u> </u>		T	.)		.)	' 1	,)
	2 ((0191	7 V (x	~PA	91~~) v (~p1~q	1 ~Y)	
	$\equiv D$								
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(999)	Find conjuctive normal form and disjunctive
	rooms form for the following without
1	using truth table: (P-9)^(q-sp)
	$=$ $\left(\begin{array}{cccccccccccccccccccccccccccccccccccc$
	= ((~p) ~q) ~((~q) ~p)
-	= Cnf
	= [~P ^ (~q v p)] v [q ^ (~q v p)]
= =	
	=[C~P ~~q) ~ (~p^p)] ~ [(q^p)]
5.1	$= P \cap Q \cap Q \cap Q$
	= [C~P^~q) v F] v [F v (2^p)]
	$= (\sim P^{\wedge} \sim q) \vee (q \wedge p)$
	= dnf.
g. <u>e</u>	Determine the validity of following
<u></u>	orgument:
	S1: All my friende ore musécions
	S2: Jahn is my friend
	S: John is not my neighbors.
	To some is they was neighbors.
	Assume that SI=P
	52=9
	53=~7
	The state of the s
	5, 15, 153, P19128
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Date: Conclusion: John is not my neighbourse ti : John is musician to John is my neighbour (q1p) 3t, i.e. It John is my friend and as my friends are musicions then John is musiciana SO, PAGANT -> 1, 1~8 i.e. If John is my friend and my friends are musiciane and none of my neighbour and mt my neighbours